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ORGANIC GARDENING

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With The Editor

Sunflower Seeds — The Forgotten Food

An Important Discovery

Part I

A FEW years ago an amazing condition in Deaf Smith County, Texas, was brought to the attention of the American public. It was found that the people in that county had wonderful teeth, with a minimum of cavities. It was noted also that when strangers moved into this section their tooth troubles ceased. New cavities did not form and old ones progressed no further. A study revealed that the soil of this county was rich in natural deposits which contained three elements important to the teeth and bones, namely, calcium, phosphorus and a trace of fluorine.

Dr. S. G. Harootian, a New England dentist cleverly figured that if he could find some food that was plentiful and cheap in price and which contained those three elements in the necessary quantities he might be able to accomplish the same purpose. He found such a food, the bones of beef animals ground as fine as flour. In an astounding experiment with nine mental patients at the Worcester State Hospital which lasted nine months, only one new cavity was formed in all that time. These patients were chosen because of their extremely bad teeth. They were fed a capsule consisting of five grains of bone flour three times daily, along with their regular diet.

The public is now wondering why it is not being let in on the benefits of this breath-taking experiment. The fact is that there is a danger in the promiscuous use of animal bones. The bones of young animals are low in fluorine content while those from older ones are sometimes too high. The danger lies in the fact that fluorine, except in such extremely small quantities as one or two parts in a million, is highly toxic. In Texas there has been reported a case of fluorine poisoning where this element was present in the drinking water to the extent of from only 4.4 to 12 parts per million. Fluorine is so toxic that it is used extensively in rat and roach poisons. It has been known to kill and seriously harm cattle eating food containing too much of this element. Yet, for perfect health the body

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must have some of it. Additional work is being done to check on this vital point and soon Dr. Harootian will have an interesting message for everyone that has teeth.

Part II

For several years we have been growing sunflowers and feeding the seeds, along with other items of food, to our chickens. We had never thought of eating them ourselves, but were fascinated with them, just the same. In fact they were particular pets of mine and I devoted some time to watching them grow. When I heard about Deaf Smith County and Dr. Harootian's interesting deductions and experiments, the thought occurred to me to check up the analysis of sunflower seeds. To my amazement the ash of the seed showed exceptionally good quantities of phosphorous (35%) and calcium (7½%) and a trace of fluorine. The fluorine in these seeds must be in a safe amount because the Russians are known to consume them in vast quantities. Some parrots live on them almost exclusively and seem to lead a contented existence.

We had grown some sunflowers with the use of compost but our late farm-hand, who was a product of the manpower shortage, had planted them much too close together and we never seemed to get the time to thin them out. The resultant seed, for size and appearance, did not compare favorably with some that we purchased but I noticed a significant fact. I could eat our seeds all day long but after a few minutes with the boughten ones there seemed to be a burning sensation in my throat.

I convinced a friend of mine, let's call him Mr. Brown, to act as a guinea-pig and about two months ago he began to eat some of our sunflower seeds every day, perhaps a good handful or more, along with his regular food. A most startling thing happened only four days later. His bleeding gums gave him no more trouble and have been in wonderful shape since. They say four out of five suffer from pink toothbrush. If not attended to it may eventually lead to something far more serious than mere cavities in the teeth, namely the dreaded *pyorrhea* and the loss of all the teeth. When Brown used to eat an apple he would see his bloody imprint sometimes on the white pulp. This no longer occurs.

Mr. Brown was not content to stop at the improvement of his gums. About a week later he advised me that a certain condition of his eyes cleared up. For a few months there had developed a slight quiver in his left eye, he stated, but after a few weeks with sunflower seeds, this went away. His eyes are not his strongest point, evidently, because, said Mr. Brown, he also had trouble walking on snow-blanketed roads. This winter, he left the house one day for a walk but had to return after being out only a moment, as the excessive brightness of the snow interfered with his vision. In fact it made the snow seem a pink color. (I have been informed that this is due actually to a hemorrhage in the eye) A few weeks ago, after being on the sunflower diet for about a month, he noticed he could walk in the snow without distressing his eyes. A few days later his car broke down and he walked over a mile on a snowed-up highway in bright sunshine. For the first three-quarters of the mile he had no trouble. On the last stretch his eyes smarted a little. He feels very much elated over it.

Progress Digest Magazine recently said, in an article devoted to the sunflower, "The oil found in sunflower seeds (about 20%) is very high in content of vitamin A and D." No doubt its vitamin A content is very helpful to the eyes. What is extremely important is that its vitamin content is preserved over long periods of storage by its armored casing. This magazine says also in this article, "It has been thought by some scientists that the seemingly habit-forming practice of eating the sunflower seed is an instinctive effort on the part of the individual to supplement his usual deficient diet."

Mr. Brown has observed that his skin seems to be getting much smoother. This doesn't seem to be unreasonable because calcium and vitamin A are specifics for a good strong epidermis. Dr. Bogert in his book "Nutrition and Physical Fitness" says, "Hard, dry skin, which may be inflamed or show a peculiar eruption, has been noted in poor people of China, Ceylon and East Africa on diets low in vitamin A, and the skin returned to normal when cod-liver oil was given. Dryness and roughness of the hair yielded to similar treatment. Skin lesions in infantile eczema are also said to clear up after giving additional amounts of vitamin A." If the eating of sunflower seeds will give Milady a smooth skin, there is a great future for them.

Mr. Brown next reports that his case of *athlete's foot* which has been with him for over 20 years seem to be improving slightly. The skin on his feet seems to be getting stronger. *Athlete's foot* is a form of ringworm and is caused by a fungus which evidently has an easy time of it in a weakened, thin skin. In line with the previous paragraph, vitamin A and calcium

evidently strengthen the skin and protect it from the ravages of destructive fungi. A great many of our diseases evidently are due to dietary deficiencies and it is foolish merely to cure symptoms (putting on salves for *athlete's foot*). We should remove the cause by not only eating the proper variety of food, but food that originates in a soil rich in organic matter without the caustic effect of the so-called chemical fertilizers.

Other advantages Mr. Brown has noticed are more frequent evacuation of the defecatory system and no desire for candy. As he is somewhat overweight he considers this last point very important. Mr. Brown is so enthused about sunflowers that he talks about it to almost every person he meets, always carries a pocketful of them and is just bubbling over with energy. To him it is *manna* from the Heavens.

I now placed four girls who had bleeding gums on a sunflower seed diet. Within ten days two of them reported complete success; no more blood on toothbrushes. One girl claims 50% improvement. This girl states her tongue does not seem to be coated anymore. The fourth girl estimates a 75% improvement. This girl claims that ordinarily her gums would start bleeding at any time, without benefit of toothbrush, but that this hasn't happened now for ten days. At this time of writing two weeks have elapsed. It will be interesting to see whether the condition will entirely clear up for the two girls.

They have been eating sunflower seeds furnished by me and which were raised with organic fertilizer. A few weeks ago I met a friend in another city who stated he had bleeding gums. I gave him a couple of handfuls of seed and told him to buy more at a bird store when he needed it. He wrote a few days ago stating there was no improvement. This opens up the question whether seeds grown with chemical fertilizers are as effective as our kind.

Personally, I think this is a matter to get excited about. I have discussed it with my dentist who is very enthused but who, nevertheless, must proceed with professional caution. He states that much experimentation will be necessary and expects to bring the matter to the attention of the proper persons and organizations.

I have gone over many books on nutrition and nowhere have I seen reference made to the value of the sunflower seed in the diet. In lists giving the vitamin content of foods, the sunflower is usually left out. Evidently this is because it has always been a bird and chicken food. Thus it seems to be left completely out of the calculations of the best nutritionists. It is the forgotten food, if there ever was one.

Milk is a food extremely rich in calcium and phosphorus and according to all the rules should produce strong teeth and gums. Some persons drink milk until it comes out at the ears, yet are below par in the gums and teeth. In the first place, by selective breeding and forced feeding, cows are giving enormous amounts of milk daily. Under natural conditions the cow is supposed to give sufficient milk to bring up its calf. What it gives today is a fluid which remarkably resembles milk and is sufficient to bring up a large herd of calves, *very* large. So, today the milk is not milk and the cow is not a cow. The cow is subject to many pestilential diseases which old-time cows never even dreamt about. On account of these terrible maladies and the fact that milk is a great germ-breeder it has to be pasteurized. Pasteurization to a certain extent devitalizes milk as a food.

In a bulletin on sunflower seeds written by the late well-known nutritionist Harvey D. Wiley (U. S. Dept. of Agriculture Bulletin No. 60, published in 1901) he says that there was an old idea that the eating of sunflower seeds would cure rheumatism. However, Mr. Wiley stated further that there was no evidence that it would. Many of the so-called home remedies have proven unusually effective when checked by the medical profession. Digitalis for heart-disease, for example, is a drug obtained from the fox-glove flower. A physician discovered an old woman using it and on checking found it remarkably successful in his work. It is now a standard medical remedy. There are dozens of other similar cases. In fact there is an entire field of botanical drugs used by many physicians. So perhaps, even as a specific for rheumatism, the sunflower cannot be waved away without some experimental testing. Our folk-lore is rich in cases of wholesome, simple cures by means of various plants.

Part III

There are many reasons why the sunflower seed is a valuable food and should be included in everyone's daily diet. In the first place nature protects it with a casing. It therefore stores well and loses very little vitamin value for long periods. When you remove the outer shell you have a concentrated bit of healthy nourishment. It tastes almost as delicious a year after

harvesting than on the day it was cut down. This is not so with other seeds. I have eaten with relish raw wheat seeds in the field on harvest day, but a month later in the barn it has already lost most of its palatability.

Secondly, you eat the sunflower seed raw. Nutritionists all agree that cooking, however skilfully done, destroys some of the vitamins. It is not a factoryized or processed food. It comes to you in virgin form. Sunflower seed oil is said to be one of the lightest oils known.

This plant is one of the easiest to grow. You have never heard of anyone spraying poisons on it because it is very hardy and is highly resistant to disease. You can grow it with plenty of compost and you will soon taste the result in as delightful a bit of food as you have ever consumed.

Now we come to a very remarkable fact about the sunflower. As soon as the head is formed it always faces the sun. This is a phenomenon called *heliotropism*. In the morning the head faces the east. As the sun swings in its orbit across the heavens, the sunflower head turns with it gradually, until, late in the afternoon, it is facing due west to absorb the few last rays of the dying sun. Sometime before the sun comes up next morning the head turns completely back to start the process all over again. Every farmer boy knows this. In other words it is just drenched with sun-vitality. Perhaps that is the reason it wards off the diseases which plague other plants. Another possible reason for the potency of this little seed is that from such a small speck, there comes in a few weeks time quite a quantity of green material, much greater than that of any other of our food crop plants in proportion to the size of the seed. Nature, therefore, must pack this tiny kernel full of powerful stuff.

Due to the fact that the seeds are so attentive to the sun, they are very rich in vitamin D which is known as the sun vitamin. Yet you can search high and low in authoritive lists of vitamins and you will not find the sunflower listed. It became lost in the shuffle somewhere and requires a new deal. Under vitamin D, you will usually find cod-liver oil, canned salmon, egg yolk, liver, cheese, butter, cream and milk, but no sunflower seed.

The Russians consume sunflower seeds by the carload; figuratively speaking of course, because the average Russian doesn't get his seed out of cars. They grow them as ornamental plants as well as in the fields. In Russia it is a national habit, indulged in by young and old, high and low.

I have talked with Russians and they tell me that on holidays when they went promenading, all pockets were filled with sunflower seeds. One of them described nostalgically the last scene he remembered of Russia. It was a hill on the top of which there lounged perhaps a dozen persons of both sexes all munching sunflower seeds. In that country these seeds are the equivalent of candy in the United States and I leave it to you as to which is more healthful. Their table oil is exclusively that obtained from sunflower seeds. The Russians are big and brood-boned and their teeth are in much better shape than the average of our country.

In Russia the sunflower is big business. There are many plants for making oil from these seeds and factories for making potash from the stalks. There are processing plants that use it to make many food products.

Sunflower seeds were very popular with the American Indian, and besides food he made a hair oil out of it. Even today many of them grow this plant. In the U. S. it is sometimes grown as a border to beautify a garden and the seeds are later thrown away. A friend of mine admitted to this crime. He didn't know whether you eat the seed shelled or with its jacket. I have since discovered many other persons who were guilty of the same uncertainty. You throw away the shell.

Part IV

To get good quality seeds be sure not to use any of the so-called chemical fertilizers. If you have not made your own compost, you might buy peat humus. You can make up an organic mixture using dried blood and bone meal purchaseable from fertilizer companies or seed stores, and wood ashes. You can use well-rotted manure. It would be an excellent idea to place a straw or hay mulch in the rows. Here is a very important caution. Make your rows at least 3½ feet wide and separate your plants at least 20 inches in the row. You will thus get finer, bigger more nutritious seeds.

In conclusion, the question arises, does it make any difference, in order to get quick results in trying to improve one's gums, whether the plant is grown with chemicals or organics. I believe that no doubt both kinds would help, but that the organically produced kind, if proper tests are made, would show up more effectively.

Will any readers who intend to grow sunflowers for sale please advise us about it as soon as possible? Will any readers who have had any interesting experiences with this plant please write?

J. I. RODALE.

Hints For The Victory Gardener

This is the seventeenth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

BY ROGER W. SMITH

TURNIPS AND RUTABAGAS

BECAUSE they will provide you with a heavy amount of very valuable edible material you will naturally wish to succeed with these essential root vegetables. If you know something of their habits of growth and origin their successful culture will be easy.

Turnips and rutabagas are very closely related. Their fine, fleshy root stalk was probably developed to its present state by prehistoric inhabitants of northwestern Europe. The turnip seems to be of slightly more recent origin than the rutabaga. Both plants are descendants of the wild cabbage and modern gardeners, when they grow them, will feel a touch of respect for the ancient and long forgotten gardeners who produced them. Nothing their equal has been produced in modern times.

The distinguishing difference between the turnip and the rutabaga is most apparent in the leaves. Turnip leaves are usually light green, thin, hairy, whereas those of the rutabaga are bluish, thick, smooth, and somewhat like those of the cabbage. Turnip roots are usually flattened spheres, disk-shaped, have no "neck" but have a distinct tap-root.

Rutabaga roots are generally rather elongated, tankard-shaped, have a thick "neck" at the place where the leaves originate, and tend to form roots other than the tap-root. Rutabagas are often sold as turnips and orange-fleshed turnips are often passed as rutabagas.

They both thrive during cool weather and are best grown as a fall crop although turnips planted early in the spring may be pulled when their roots have attained the size of golf balls.

Rutabagas are commonly planted as a late, storage crop to mature in the fall. They require from four to six weeks longer to mature than turnips.

With this much information you may have formed a tentative plan regarding their growth somewhat as follows:

White Milan, 48 days to maturity, to be planted with the first radishes and harvested while immature.

Early White Globe, 55 days to maturity, to be planted following the removal of an early crop such as peas or early potatoes.

Rutabaga, Purple Top Yellow, 90 days to maturity, to be planted in the early summer, to be used for storage.

Naturally, your personal preference will dictate your selection. For example you might prefer a yellow-fleshed type rather than a white and plant Golden Ball instead of White Milan. Whichever type you grow, one packet of good seed is more than enough for fifty feet of row and should yield almost two bushels of fine roots.

Cultural practices for turnips and rutabagas are about the same. Almost the only real secret of success with them is that the seed bed must be both moist and moisture holding. The plants will develop fine roots only when an adequate supply of natural plant nutrients is easily available. They will flourish in almost any good garden soil provided it is rich in organic humus and contains an ample quantity of calcium (limestone) and is therefore free from excess acidity. The soil also should be deep, well pulverized, free from clods and stones, and have normal drainage.

After the row has been marked out, you will find it advisable to dig in as much compost humus as you can spare. This material will add mellowness and plant nutrients to the soil and do much to improve its texture and moisture-holding capacity. If the soil is very heavy (clayey), sand may be dug in also; if it is very light (sandy) it may be worth your while to dig in peat moss, natural leaf mold, or some similar substance as well as compost humus to improve conditions.

Turnips seem to defy the use of any combination of artificials but you will find that if a liberal sprinkling of chicken manure is well worked in along the row be-

fore the seed is planted substantial roots will result. Old time gardeners also sprinkled a little soot from a wood fire into the drills before planting the seed. Modern tests tend to show that this practice promotes quick root growth.

Turnip seed is rather small. It should be planted with care, about fifteen seeds to the foot of row in a shallow drill, covered with one quarter-inch of finely sifted compost humus, and properly firmed. To aid in proper germination, the seed should be soaked in water for twenty-four hours before planting.

Just as soon as the seedlings have attained their fourth leaf they should be thinned to stand about four inches apart in the row. The rows are most convenient at fifteen inches apart. A spoon, securely bound to the end of a broom handle, makes a handy implement for properly lifting the seedlings, which may be used for starting a new row.

Turnips and rutabagas grown under proper conditions are little damaged by plant disease and insect pest although early spring turnips are sometimes attacked by turnip aphids. You will note that in this case the plants start in cool weather and develop their roots with the weather increasingly becoming warmer. But if these plants are dusted with finely powdered wood ashes the aphids can be quickly checked. Aphids will do little damage to healthy, compost-grown plants. Even finely powdered, dry top soil is effective in discouraging them when it is brought into contact with them. You may have noticed that small birds customarily get rid of vermin in their feathers by this same method when they take a dust bath.

Of plant disease, club root, a disease caused by slime mold, was formerly very destructive of turnips grown under improper conditions. The Bruce, a strain of turnip to which most good turnips of today are related, was discovered to be practically immune to clubroot. It originated in Scotland and seems to have been an accidental cross between the turnip and the rutabaga. This might lead you to a much greater admiration of the homely rutabaga. You might consider it the father of all turnips. Seed of only three or four strains of fine rutabagas are available to you on the market whereas seedsmen list as many as two hundred and fifty strains of turnips many of which secretly owe their fine qualities to their rutabaga ancestry.

Turnips and rutabagas are not improved by frost as are parsnips and salsify. Just as soon as fall frosts approach, the roots should be pulled and the tops removed leaving about one inch of stem attached. Rutabagas are definitely more suited to storage than are turnips but both may be stored in the pit, barrel, or trench method provided they are given sufficient protection by alternating layers of straw and earth to keep them from actually freezing. It is best not to attempt to store them in the house unless a really cool place is available because of their strong odor.

And whilst you are planning the storage of fall maturing turnips and rutabagas, you might like to arrange for a plentiful supply of early spring greens. Turnips are often grown for their foliage. Seed of an old favorite the "Seven-top" turnip (fifty days to maturity) is available. Planted in late summer and given adequate protection during the winter, this plant will supply you with an abundance of very early greens of excellent quality. Its root is not edible. A newer type, the "Shogoin" is claimed to produce both edible greens and edible root.

Turnip seed of any especially fine root may be easily saved by storing the root over winter in such a way that it does not become hard-frozen. More than one root should be saved and those which have early matured and not become hard are most likely to form viable seed. As early in the Spring as the ground can be worked the selected roots should be set and the tall seed stalks supported by stakes. The seed pods which form should be harvested as soon as they turn yellow, preferably early in the morning to avoid shattering and placed in a protected place to be later separated and dried.

Turnips have long been held in high esteem as a "protective" food. In ancient days they were recommended as restoring strength to the aged. Modern science has, to a great extent, confirmed this belief. It has been shown that properly grown, healthy turnips are an excellent source of the Vitamins C and B1, that they are rich in mineral potassium.

In the fall your crop might be quite beyond your expectations and you might like to pass along the following hint to the Victory gardener's wife. Turnips and rutabagas may be used to make sauer-ruben the equal, if not the superior, of sauerkraut. The turnips should be washed, peeled and shredded, otherwise the procedure is the same as with sauerkraut.

But in whatever form you use this fine vegetable you will better understand it by growing it and in mid-winter, when the snow drifts deep over your garden and when the supply of healthful vegetables is vitally important, you will most appreciate its true worth.

Re-Fertilisation by Compost and Muck on a Large Wiltshire Farm

BY F. SYKES

The Reclamation of 750 Acres of England's Highlands

From News Letter on Compost (England)

THOSE who have seen the effect of compost on gardens have found themselves puzzled and disappointed that it is not widely used in English farming.

Readers of the News Letter on Compost will understand, perhaps, when they have read this note why this state of affairs exists.

There is no more important problem troubling the would-be intensive farmer in this country to-day than that "if this war goes on much longer, and I am compelled to maintain my present continuance of depleting-fertility-cropping, how am I to keep up the fertility of my farm, and when the war is over, how am I to avoid being left with a farm that is worn-out and utterly exhausted of every bit of its fertility? I am compelled 'by order' to use stimulating artificial fertilisers which, while giving a crop for the moment, are leaving me with a soil that will be bankrupt and useless."

Every farmer of any education and experience knows that he cannot farm for ever without organic replacements, and yet he does not put them into the ground. *Why?*

Millions of tons of straw are lying in ricks all over the country and no attempt is being made, except in isolated instances, to tread this into muck in the good old-fashioned way. *Why?* To answer these two questions one has to examine the background that has produced this set of conditions.

I think the trouble really began in 1846, when Sir Robert Peel passed the momentous Act, "The Repeal of the Corn Laws." This Act, although it actually took a long time to do it, proved the death-knell of British farming. There are no complete statistical data available with which to measure its effects upon British agriculture during the ensuing 20 years; but figures are obtainable for Ireland, and these show that areas under wheat, barley and oats declined by 570,000 acres between 1847 and 1854. The floodgates for *cheap food* had been opened, and when the development of transport in the new countries of the world, together with the invention of the self-binder, enabled the virgin prairies of those countries to be exploited fully, the British market stood open, ready to absorb a steadily increasing flow of imports. Then there followed a sensational reduction in freight rates. The cost of moving wheat by rail from Chicago to New York was 10/2 per quarter, and from New York to Liverpool from 5/6 to 1/7½ in later years. The opening of the Great Lakes Route more than halved the cost from Port Arthur on Lake Superior to Liverpool. With no re-fertilisation to bother about, the New World soon made corn growing, in all its branches, anything but an attractive business proposition to the British farmer, who, with small fields, no mechanical power, and with re-manuring as an essential of good husbandry, was at a serious disadvantage. As one looks back over the periods of change of the last 97 years, one is not surprised that farming at the outbreak of this war was devoid of technique, machinery and implements; but rather that there were any men of any kind—farmers or workers—to be found on the land at all.

The late Christopher Turner in his "Yeoman Calling" says of one of his best tenants, "In the summer of 1938 one of my tenants (aged 42) said to me: "Something is wrong. I have worked for twelve years, I have

lost my capital. I have now only an overdraft, and I have lived hard." This man was a good farmer. With economic pressure like this the British farmer was steadily driven into effecting every possible economy; land was allowed to tumble down to grass; the labour bill was reduced by every means. Workers left the land, not because they did not like the work thereon, but because there was less and less work for them to do. Our towns became increasingly congested, our countryside derelict and depopulated. Taking the whole of the world's manpower, we find that 3 out of every 4 persons are employed in agriculture; but in Britain the proportion is less than 6½ per cent.

The most important of all farming operations in maintaining fertility is to return to the soil all that the farmer took from it. This involves the handling of an enormous tonnage of muck or compost. There is at present no alternative of manual labour to perform this function; and as a consequence the job is only partially done at best, and all farmers have to reduce it to a minimum, to the great detriment of fertility, because there is *no labour available*. To-day, therefore, British farming methods have to be based, not upon what the farmers know to be best for their land, but upon what work they can get carried out on their farms. We talk officially about our high degree of mechanisation because we have about one-third of the tractors we require. Mechanisation only begins with tractors, and the mechanical handling of muck runs the tractor pretty close in importance. When this latter achievement is successfully accomplished then, and not till then, will you see the fair lands of England begin to absorb the millions of tons of straw and organic manure that is waiting to be returned to it. Having explained *why* the farmer is not using compost as the small gardener does, I will now tell you a little of farming on a large scale using organic manures as the system of re-fertilisation.

In 1936, here on the highlands of Wiltshire, some 829 feet above sea level, we began farming 750 acres of derelict land. We left behind us in Buckinghamshire some of England's choicest soil, to tackle the most forlorn piece of wild, rabbit-ridden country you could find out of doors. 10,000 rabbits were killed the first year, 5,000 the second, and some 3,000, each year since. With an out-door milking bail we began to milk a herd of 60 cows. The manure and urine was dropped fairly evenly over the farm; food was purchased from outside as the land was too poor to sustain the cattle, and, as each field was thoroughly re-fertilised, the plough was brought into action. This process was carried on throughout the farm; and the fertility was increased to such an extent that now succeeding crops of oats and wheat have been grown on some fields yielding 88 bushels and 56 respectively. This is probably more than twice the average for the whole country. Moreover, the cattle population has increased to 130, and we are making arrangements for another 50 to be added in the near future. No outside food is now bought for the animals, and the produce sold off the farm is really astonishing. Individual fields presented different problems of treatment. One, for instance, was utterly bare, even of weeds. The soil was dead. Here we folded the cattle, spreading straw, carrying food to them; then we ploughed and sowed rape and rye-grass. The cattle were folded again, and in this way the soil was brought into life. This field was very obstinate, one of the most dead pieces of land in my experience; but to-day its 30 acres are growing really magnificent crops of oats, potatoes, mangolds, kale and swedes. It has received two heavy dressings of farmyard muck and compost, and the crops now growing would cheer the heart of any farmer.

The secrets of reclaiming derelict land like this are to be found in a technique which covers:—(a) Copious dressing of organic manures; (b) adequate cultivations, which means many ploughings, harrowings, at least one subsoiling, 2 feet deep, and thorough cleaning; (c) the use of well-balanced temporary leys, containing clovers, sainfoin and lucerne.

This high thin land cannot be farmed without livestock; but with an adequate head of stock, crops of the best quality and heaviest yields can be obtained.

If artificial fertilisers were used—and used without organic manures—this soil would soon revert to dereliction.

When the whole of the farms of England are farmed with compost—and I am sufficiently sanguine to hope that one day they will be—there is not the slightest doubt that we can grow enough food here of every kind (excepting citrus fruits, tea, coffee and the like, which represent a small amount in the aggregate) to sustain a population of more than twice that in Britain to-day.

The most important aspect of compost re-fertilisation is the health of the people and of the livestock. My experience tells me that a healthy land produces healthy livestock and a healthy human race. Organic re-fertilisation does that little something to the land which the artificials

cannot do. We have a large attested herd of Channel Island dairy cattle here, living at an altitude where it was thought dairy cattle could not survive. We have eliminated disease from the farm, and as each successive generation of young stock comes into being there is a noticeable improvement in health, physique and endurance. The crops consumed are now entirely homegrown. As the fertility still further rises—we are nowhere near the peak of production yet—I expect that our stock carrying capacity will increase yet one hundred per cent., and the crops for human consumption to be sold "off" the farm correspondingly increase. Without organic manures these 750 derelict acres could never have been reclaimed.

F.S.

Chute, via Andover,
Wilts.
May, 1943.

Note by Sir Albert Howard.

Mr. Sykes has asked me to support and supplement the above article. This I do with the greatest pleasure in the world.

In May, 1942, I first came in contact with Mr. Sykes when I received a letter from him, telling me what he was doing on the downs of Wiltshire and suggesting that one day I might pay him a visit. It happened that I had just then arranged to see Dr. Westlake's work at Fordingbridge, which is described in the *News Letter on Compost* of February, 1942. I visited Chute on June 17th, and again on July 15th of last year.

In a way I was prepared for what I saw at Chute, having seen the remarkable results obtained by Mr. Hosier with his open-air system of milk production and those of the late Sir Bernard Greenwell on the subsoiling and composting on heavy land. Nevertheless, I was astonished to see what can be done on the downs by a combination of the bail system, thorough cultivation and subsoiling, together with suitable grass mixtures containing deep-rooted perennials like saintoin and lucrene stimulated by copious dressings of organic manure. Although the elevation was over 800 feet above the sea and the soils were poor and thin, the cereal crops were about the best I have ever seen: the live stock were in good fettle: the whole farm was evidently on the up grade.

But all this progress was landing Mr. Sykes into an obvious difficulty. These splendid cereal crops meant an abundance of straw which, it was obvious, should be composted. But the labour force available was quite insufficient for the task of handling such vast quantities and composting with it all the weeds and other miscellaneous vegetable wastes on the farm. Moreover, the autumn and winter of 1942 were exceptionally wet, a factor which naturally put an increased strain on the labour force.

The problem could only be solved by mechanization. Mr. Sykes then set to work to devise a muck-shifting crane which could be driven by a tractor, so that the loading of muck into suitable carts, the assembling of the compost heaps, the turning of the compost and the loading of the finished product into manure distributors could be done by a single machine. Such a machine has been devised and a sample is being made by a well-known firm of crane makers. It will be tried out this summer and it is expected that a suitable machine will soon be on the market which will enable any farmer of 200 acres and upwards, who possesses a tractor, to take up the reform of the manure heap—the weakest link in British agriculture—and convert all the vegetable and animal wastes available into compost. Then and then only will it be possible to make the fullest use of the huge quantities of straw now lying unused and to resume the development of British farms at the point where Coke of Norfolk left it early in the nineteenth century. Progress will then be rapid and in a very few years this country will not only be able to feed its population, but even export high-quality food. But all this is only the beginning; as the fresh produce of fertile soil replaces the murdered food to which we are now condemned through the operation of certain vested interests—which are clearly profiteering at the expense of posterity—England will be born again. Our greatest possession—our population—will then come into their birthright—health.

Is Basic Slag Really Necessary?

BY SIR ALBERT HOWARD, C. I. E.

Fellow of the Imperial College of Science

ON many of the heavy soils under grass the limiting factor in humus production is oxygen. Everything except air is there in abundance for making humus—vegetable and animal wastes as well as moisture. Under such turf the land always suffers from asphyxiation. The soil dies. This is indicated by the absence of nitrates under such turf.

About fifty years ago it was discovered that such pastures could be improved by dressings of basic slag. As this material contains phosphate, and as its use stimulates the clovers, it was assumed that these soils suffered from phosphatic depletion as a result of feeding a constant succession of live stock, each generation of which removes so many pounds of phosphate in their bones. When, however, we examine the turf of a slagged pasture we find that humus formation has taken place. If the application of slag is repeated on these heavy lands after an interval of five or six years there is often no further response. When we apply basic slag to pastures on permeable chalk soils there is no result. There is phosphate depletion on strong lands only at one point; none at all on light chalk downs. These results do not hold together; indeed they contradict one another. Are we really dealing with phosphate deficiency in these lands? May not the humus formed after slag is added explain the permanent benefit of this manuring? May it not prove that the effect of slag on heavy soils has been a physical one which has improved the aeration, reduced the acidity (by virtue of the limestone residues in the slag) and so helped humus manufacture to start? We can begin to answer these questions by studying what happens when the aeration of heavy grassland is improved by an alternative method—subsoiling.

The effect of sub-soiling heavy grassland was described by the late Sir Bernard Greenwell, Bt. in a paper read to the Farmers' Club on January 20th 1939, in the following words:

"Taking our grass-land first, probably more can be done by proper mechanical treatment followed by intensive stocking than by artificial manuring. Some people are suggesting that we should plough up a lot of our second-rate pasture land and resow it, but this I have found is very speculative as the cost is in the neighbourhood of £3 to £5 an acre and the results are bound to be uncertain. By cleaning out ditches, reopening drains and by mole draining, however, a lot can be done. I have also found that by using a Ransome sub-soiler of the wheel-type, pulled through the land at a depth of 12 to 14 inches, 4 feet apart, one can produce much better grass, and this is proved by the greatest expert of all—the animal. In a field which was partly sub-soiled we found that this sub-soiled part was grazed hard by the cattle, and the part that was not treated in this way was only lightly picked over. The cost of this is about 2s.6d. per acre without overheads and lost time. We reckon £1 a day for a 40-h.p. tractor, including labour, depreciation, etc., and a tractor will do 9 to 10 acres a day sub-soiling at 4 feet intervals."

Poor aeration was obviously the limiting factor at Marden Park. Once this was removed humus formation started and the herbage improved. It would be interesting to watch the results of the next stage of this work. Half of a sub-soiled field should be dressed with basic slag and the reaction of the animals watched. If they graze the field equally, basic slag is probably having no effect: if the animals prefer the slagged half then this manure is required.

The Marden Park results and those recently obtained by Mr. F. Sykes on his estate, at Chantry, Chute, Wiltshire, and de-

scribed in the issue of the *News Letter on Compost* of Oct. 1943, pp. 7-15 suggest a further question. Will sub-soiling, at say 5/- an acre, partly replace the ploughing up campaign recently launched by the Ministry of Agriculture for which the State now pays £2 an acre? If, as seems likely, the basic slag and ploughing up subsidies are both unnecessary, a large sum of money will be available for increasing the humus content of the soils of Great Britain, the need for which requires no argument.

During the year 1943 a correspondent, Mr. R. Delgado, Little Oreham, Henfield, Sussex, carried this basic slag question a step further. He prevailed on his local War Agriculture Executive Committee to sub-soil one of his pastures. At the same time a neighbour applied 10 cwt. of basic slag to each acre of similar land. The results are summed up in the following report, dated Nov. 27th 1943, which Mr. Delgado has very kindly sent me.

Subsoiling Heavy Clay Land Under Grass as Compared with a Dressing of Slag.

After reading Sir Albert Howard's *Agricultural Testament* and the account he gives in it relating to the work of the late Sir Bernard Greenwell with the use of a sub-soiler on pastures overlying clay, it was decided at once to contact the local W.A.E.C. with a view of finding out the name of a contractor who possessed the necessary tackle to carry out such work on my farm.

The local committee wrote back to say that I was misinformed and that the only use a sub-soiler had was on arable ground behind a plough. After a further exchange of letters, they agreed to send a crawler tractor and a wheel type Ransome sub-soiler.

A further argument ensued as to the depth and distance apart but after the sub-soiler had been up and down the field once, I pointed out to the officer that no effective shattering of the subsoil could take place further than two feet on either side of the share, and he eventually came down to doing them six feet apart, and fifteen inches deep.

Had the work been carried out strictly in accordance with Sir Bernard's stipulations I am certain that the eventual results would have been better. However the response from the worst field on this farm was encouraging. When the work was completed it was stocked with yearling and bulling heifers and three horses. There was not much grass on the field to start with, so good and bad hay were fed to supplement the grazing. The good hay was, naturally, consumed and the bad was dunged and trodden on to form compost in situ. The field was finally shut up in July absolutely bare, four months after subsoiling.

Despite the absence of rain in this part of the country during the summer, the flora on this meadow had changed to an emerald green on shutting up and has remained so ever since.

On November the 20th I went to look at it and was agreeably surprised to observe many worm casts which had hitherto been absent. The milking herd was turned into it the following day. Their relish for the short bite was very noticeable, particularly where the worm casts were more numerous, and the milk yield went up.

In the autumn of last year a friend farming nearby on the same type of soil, dressed a meadow with 10 cwt of slag to the acre. I was privileged to see it this June, closely grazed and a very good colour. Everyone is aware of the virtues of slag on clay soils.

In July, just before shutting up the field described above, my friend paid me a visit and we were standing in this field having a look at my young stock when she remarked on the greenness of my turf, complaining sorrowfully that her slagged meadow was brown, scorched and devoid of any feed.

It would be as well to state here that the flora in my particular meadow was that which is found in pastures which "tumbled down" to grass after the last war with a proportion of volunteer clover and a semi-swamp variety of weeds, whereas in my friend's I had seen a preconceived mixture of grasses and clovers. And in order to complete the treatment of my meadow, after a pulse crop has been taken, it will be sown down to deep rooters and Leguminosae.

There remains the cost of the work. Sub-soiling by contract with the W.A.E.C. under the mole draining scheme inclusive of piped outfalls averaging three to each four acres and inclusive of a 50% grant, came to a little over 25 shillings per acre. Subsoiling as recommended by Sir Bernard Greenwell with one's own power and tackle one could probably carry out to-day for a maximum of 5 shillings per acre.

The cost of slag which is either £6 per ton or £3.10.0., I am not sure which, would work out on a dressing of 10 cwt. to the acre at the lowest at 35 shillings per acre exclusive of labour.

Though admitting that slag is better than nothing in that humus formation under the turf sets in after a suitable application; apart from the relative

merit of costs I am of the opinion that one can obviate any unknown chemical reaction in the soil by seeking the same if not possibly better results by the use of the sub-soiler. Unfortunately, I have not as yet been able to go and see the slagged meadow this autumn to discover what verdict is given by the earthworm.

It might be of interest to add that fungi in the shape of mushrooms only very sparsely scattered in my meadow last year, abounded in great numbers this autumn, whereas it is well known that slag will do away with them for evermore.

These preliminary indications suggest that further work should be done on this subject during 1944. A number of pastures on heavy land of the type likely to respond to dressings of basic slag should be selected and then accurately divided into two. One half should be slagged at the rate of say 10 cwt. per acre, the other half should be sub-soiled 12 to 18 inches deep, 4 feet apart. The response of the turf should then be watched and careful notes made of the reaction of the grazing animal. The stock, in all probability, will always prefer the sub-soiled halves of the fields.

If my surmise proves to be correct namely that the effect of basic slag on the soil is mainly physical and that it acts as a humus forming agent by leading to better aeration, than what really matters in improving heavy land is not more phosphate but more oxygen. The easiest method of supplying oxygen is to link up the sub-soil with the atmosphere by means of a sub-soiler. Furthermore not only will the cost of improvement be greatly reduced but the lasting effect of this method of aeration is much superior to anything that can be obtained by a surface dressing of slag.

Such simple trials as those indicated will also throw light on a related problem—the supply of other minerals such as lime, potash and the various trace elements. As a rule ample quantities of these substances exist in the subsoil; the difficulty is to get them into effective circulation so that the crop can use them. The ideal method of course is by means of the roots of trees—by the adoption of a long term rotation of forestry and farming. In this way the roots of the trees would: (1) collect minerals from the subsoil and transfer them to the surface soil by way of the green leaves and the resulting humus left by their decay and (2) provide the soil and sub-soil with a very effective drainage system as the roots decay. But such a long term rotation as this is out of the question on an ordinary farm. It is only possible on a very small scale on the part of bodies like the Forestry Commission. The farmer, however, has ready to hand an efficient substitute for the forestry-farming rotation. He can bring the vast reserves of minerals in the sub-soil into immediate circulation by means of the sub-soiler followed by the deep rooting ley on the lines laid down in *The Clifton Park System of Farming* (Faber & Faber, London, 1943). He can repeat almost everywhere the remarkable results which Mr. F. Sykes has already obtained on the Wiltshire downs.

What is needed now is a definite answer to the question—*Is basic slag really necessary?* Many farmers if they carry out the suggestions in this note can obtain the reply before 1944 is out.

I am confident that the answer will be in the negative and that the day is coming when the supposed mineral deficiencies in our soils will be regarded not as real deficiencies but as proof positive that our fields are suffering from temporary deficiency diseases which can be put right at once by restoring the circulation of minerals by appropriate methods of management including subsoiling.

One difficulty will have to be overcome in carrying out the simple tests suggested. There is no spare stock of suitable subsoilers now on the market—at least I have not been able to discover any. There are however a number of mole draining outfits in the possession of the various War Agriculture Executive Committees. It is a simple matter to alter these machines for sub-soiling by replacing the mole with a subsoiling attachment.

The benefits of sub-soiling heavy grassland will not end in showing that basic slag is unnecessary. This treatment will also increase the stock carrying capacity of the pastures which still remain to us and so help in building up the additional head of stock now so urgently needed all over the country. Sub-soiling will also lead to a considerable increase in the yield of corn crops and will thus make it unnecessary to plough up any more grass.

The grow more food campaign can therefore best be advanced not by increasing the arable area at the expense of permanent pasture but by making both arable and grass more productive. In this task we must naturally make the fullest use of all the minerals now lying unused in our sub-soils. Once we do this, it will be found that basic slag is emphatically *not* necessary.

The Odorless Privy

BY H. C. HAAS

WE all know and love the old song about the Old Oaken Bucket that hung in the well, but if anyone ever wrote a song about the old wooden privy that stood at the end of the lane, it did not become popular for obvious reasons. When the virtues of a properly made and operated privy are universally recognized as they should be, we may all want to sing about it.

Organic Gardening fans (Who on earth should not be one?) were advised on the first three pages of the November 1943 issue how Editor Rodale succeeded in producing, first the odorless cattle pen, and then the odorless chicken roost. His steer pen gave off very offensive odor throughout the summer of 1942 and was without odor throughout the summer of 1943. Nature ended the odor, not he. The big thing which Farmer Rodale did was to take note of the end of the odor and find the cause. The manure and straw mixture on the floor was "cultured" with bacteria during the second summer. If an odorless steer pen, why not an odorless chicken house, and by the same means?

So friend Rodale built a new roosting pit under forty hens, with contents in two layers—six inches of very fine topsoil in the lower, and a wheel-barrow load of the odorless "cultured" manure from the steer pen in the upper, evenly spread. That chicken house was rendered perfectly odorless. Billions of micro-organisms in that pit did what Editor Rodale had accomplished earlier in another like pit under forty others hens with 18,000 earthworms. The odorless chicken house was accomplished at negligible cost. The idea and method are free to all.

The whole surface of the earth, wherever plants and animals live and thrive, is normally like that. In the soil there is action like that in Editor Rodale's steer pen and chicken houses. All the animals, birds and insects, including man, *normally* put all their droppings, and their final remains also, upon the soil. Then in the soil a process of digestion goes on, where and when temperature permits, which transforms the droppings, however fetid they may be, into an odorless humus acceptable to plant life. The digestion can be accomplished only by the normal life in normal soil —the bacteria and fungi of myriad number and kind, the study of which has hardly begun. One of them is the penicillium notatum, which Roger W. Smith told us about in February. These soil micro-organisms, and the earthworms, form a very considerable part of the bulk of normal soil, and have been in silent and invisible partnership with all life above the ground for all the ages of which geology gives us account. Ancient human civilizations have interfered much with their activity—have, in fact, destroyed them on large scale, not knowing they were there. The decay and disappearance of those civilizations was largely due to the destruction of the life underfoot. Man of the modern era, being aided so magnificently and terribly by bigger and bigger power machinery, of which he is so proud, has in his ignorance, more stupid than malicious, much magnified the destruction and is being enabled by highly developed and fast transportation means to reach out for new areas to deplete. Thrilled with his technological accomplishments, he has, with more thoughtlessness than selfishness and vice, very largely allowed the topsoil life to be killed in various ways, mostly by chemicals and fire, and by withholding from the soil the organic return which is its due. How much is gone? Some say about half of our topsoil.

Soil life is microscopically and chemically as complex and intricate as any other life, and just as vulnerable to poisons, and synthetic inorganic built up mixtures as we would be. Soil life demands food as organically complex as any we eat ourselves. Just as we, soil life can absorb profitably certain mild inorganic chemicals, well diluted, and sparingly offered, but the bulk of its food must be organic. The only true "fertilizer" is organic matter, animal and vegetable, digested by soil life into humus.

It is true that the soil may need a certain amount of chemical buildup to replace loss due to leaching by rain water. But the amount and kind of any

chemical added must be entirely acceptable to soil life.

It is not true that chemicals are a substitute for organic return. In these United States we use per capita per day certainly more than a couple of pounds of organic produce, brought from far and near. Add together the weight of all the commodities of organic origin sent to the cities from the fields and forests,—the foodstuffs, the cotton, wool, rayon and silk clothing, the upholstery, bedding and towels, the paper for a hundred uses and misuses, the wood, the rubber, the leather, the furs, the tobacco, the explosives used in war, and many others. And civilized man demands so much more of all these than do the uncultured savages! The higher his standard of living, the higher his demand.

Our civilization has pillaged and burned and poisoned the topsoil of America for scores and hundreds of years. The fifty-million buffalo, which alone bulked in flesh six or eight times as much as we, and all the other wild life of America, which bulked perhaps as much as the buffalo, now all largely destroyed, thanks to us, — all this animal life nourished the topsoil as it should be nourished, and left it to us complete and in good condition. Their weakness was that they could not kill at a distance!

America, thy woods and templed hills have been devastated, and thy rills have become torrents, which must be dammed! The topsoil will no longer hold the rain because the topsoil is gone!

The cities put practically nothing organic back upon the land, and have admitted no debt to it! True, the cities pay the farmer in money, part of which he uses for undigested organic fertilizer if he can get it. Unfortunately he is being educated by the "best of authorities" to believe that inorganic chemicals can be used as a satisfactory substitute. He likes them. They are easy to handle.

The cities and towns incinerate, throw into the ocean or pile up on dumps the larger part of their organic waste, amounting to millions of tons per year, all of it life-perpetuating matter. It is disagreeable to put it back upon the land. It stinks and draws flies.

We think of ourselves. We refrigerate and package attractively and carry thousands of miles the perishables we consume ourselves, but we cannot afford to refrigerate and package and transport even as far as one mile that which is due our partners in the soil. "The ground is just a place to grow things in. How it grows them we don't know or care." We did not know the ground could be used up or lost. We thought it was as inexhaustible as the atmosphere. We are beginning to learn. If we don't give vitamins back to our partners in the soil we shall not get any ourselves, except perhaps in pills made too expensively for most of us from the bodies of fish, which we have not been able to rob by burning or otherwise.

What can we do about this all? Only make a beginning. Violent change is disastrous. We can begin with the odorless privy. We can build a pit under the privy like the one Mr. Rodale built under his hens. In the pit we shall put the same humus and "cultured" manure that he used. The culture must be kept alive and the life in the pit nursed as we nurse all the other farm animals. That life needs warmth and water, not too much or too little of either, and attention the year round. If the culture is of the right kind, containing, perhaps, p. notatum and other equally desirable microscopic life, and other right conditions are maintained, there will be no stench and the product will be the richest possible odorless humus, d e v o i d of pathogenic germs. This humus may need to be combined later with vegetable waste in the compost pile, before use on the land.

We can moreover compost our garbage, sawdust, leaves, and all the other live organic waste that we can get our hands on. That matter produced life before and is the best possible means for doing it again.

The closer we all can get to the land the healthier and happier we will all be. Food will cost less and all the vitamins will be in it. Refrigeration and transportation over long distances make food costly. Storage and processing to improve keeping qualities destroy the vitamins. It is unnecessary to refrigerate what one can cull out of the garden and eat the same day. Food carried thousands of miles over land and ocean puts a terrible burden on our civilization, particularly in view of the waning stock of the earth's fuel.

One hundred and thirty odd million people ought to be able to determine how the desirable result can best be attained, after they can decide for themselves how essential it is, not alone for the mere well being of the race, but for its very continued existence. We want to stay on earth and we do not like the disappearance of the birds and the other animals that we love. America can find in this a way to earn and hold the respect of all mankind, of this generation and others to come.

Fortunate it is that the entering wedge in our much needed social reorganization can be so painless and pleasant!

A normal richly organic food supply not only will maintain our health but it will bring back our ability to normally produce offspring. All the glamor we have learned to crave, revel in, and gloat about, in later years being bored to distraction with it all, the luxuries urged daily upon up by high pressure advertising—the glamor of possessions—sumptuous homes, fast cars and boats, jewels, the latest model of this and that — streamlined — pastel shades — all the things that nations quarrel and get jealous about — all these, coupled with the vices that go with them, weaken us morally, physically and mentally, and do not keep our bodies fit even to stand up and walk. Children cannot be made in the factory on an assembly line, and we have been led to worship too many things that are made there.

It was Jesus who said such powerful words about possessions, and about children, and so long ago. He said them first.

A Warning From The New World

BY SIR ALBERT HOWARD, C. I. E.

AT the beginning of the last century one of the most flourishing crops on the east coast of the United States of America was wheat. The *History of Agriculture in Northern United States,* 1620-1860, by Percy Wells Bidwell, Ph.D. (published in 1941) quotes a report from the state of Maine, printed in the United States Patent Office Annual Report of 1843, as follows:

"Twenty years since, our land produced a fine crop of spring wheat with as much certainty as we looked for a crop of hay. But this has sadly changed. Numerous enemies have sprung up, among which mildew, and rust, and the weevil are the greatest, till the raising of a field of wheat is viewed as an experiment. A majority of our farmers have abandoned the trial entirely."

What was the cause of this almost incredible change from total success to total failure in so short a period of time? A clue to the answer is contained in another extract from this book, which deals with wheat-growing in New England during the period 1840-1850, with special reference to the neighbouring state of Vermont:

"Several reasons were given for the decrease in wheat acreage, chief among which were competition in the west, soil exhaustion, and the repeated attacks of wheat midge, rust and Hessian fly. Vermont reported a large decline on her clay soil caused by the ravage of the midge and declining soil fertility."

From this it is obvious that the root cause of the trouble was soil exhaustion. The colonization of Maine and the adjacent states took place between 1629 and 1638. For almost two hundred years the humus in those rich, virgin lands produced abundant healthy crops of wheat to feed the colonists, but it seems clear that they were living upon capital and not putting back into the soil the riches which their wheat drew from it. When at last the land began to go on strike, the decline was rapid and catastrophic. In less than twenty years the raising of a normal crop had become problematic, and many farmers gave up the contest entirely.

The wheat midge, weevil and Hessian fly, the mildew and rust, which ravaged the struggling plants were not, as is suggested above, a contributary cause of the degeneration, but simply symptomatic of the widespread exhaustion of soil fertility. Nature, by these ravages, was merely insisting that the land must be given complete rest and time to recuperate, and she gained her point. She forced man to accede to her demands: the acreage under wheat was markedly decreased.

Here, then, is a stern warning to all concerned in the food-production campaign of the present day. The call to grow more and more wheat and other cereals has met with a great, patriotic response and with each year that passes still greater efforts are being made. But we are living on the stored-up fertility of the past —our capital. Sooner or later— and, judging by the rapidity of the decline in New England, it may be much sooner than the most far-seeing would anticipate —the soil of our island must go on strike, unless we see to it that at least as much energy is consumed in putting back humus into the soil as is used in extracting our ever-increasing food crops. The task is immense, but it is urgent. Let Old England take warning from the experience of her children in the New World and look to the land before it is too late.

Feb. 17, 1944.

The Clifton Park System of Farming

BY ROGER W. SMITH

"The Clifton Park System of Farming" by Robert H. Elliot, 1942 Edition, with an introduction by Sir George Stapleton (Faber & Faber, Ltd., 24 Russell Square, London, England)

THE first edition of this remarkable book was published in 1898 under the title of "The Agricultural Changes required by These Times, and how to carry them out." It was to meet these changes—an agricultural depression and the introduction of artificials—that Robert H. Elliot devised his system. A modern edition of this saga of agricultural fundamentals is indeed timely.

Elliot was a good farmer in a difficult position. He was attempting to rejuvenate a farm of about one hundred and fifty acres that was so "run-down" that patches of stoney land spotted the meadows. He had to do this without bringing in materials, manure, hay, feed-cake, etc., from outside sources. He solved his problem in a sensible manner and his solution, "The Clifton Park System of Farming" is well worth close study.

Elliot viewed artificials with scepticism. He believed that the physical condition of the soil was more important than its chemical make-up.

The main crop of the farm had formerly been grain, the production of which through the use of artificials had resulted in the impoverishment of the soil. Elliot saw that he had to get the humus back into working order, rich deep and fertile. He had to build fertile humus without the aid of outside materials.

Elliot explains his method of increasing the humus layer of the soil. He suspected that certain combinations of grasses would build up in the shortest possible time, a deep layer of fertile humus. He made extensive experiments covering many years to discover the best mixtures of grasses, both as regards the formation of humus and the health of grazing animals using it.

First, he improved upon the rotation then favored in his locality. This rotation then practiced was to follow two years in grass with one year each in the following: grains, root, grains, then put the area back to grass again for another two years. Elliot modified this system by: *four* years in grass, followed by one year each in the following: *roots*, grains, *roots*, grains, then back to grass for another *four* years.

He made this change primarily to permit the grass-covered area to remain humus-accumulating as long as possible. He also found that it was best to follow grass with a root crop—almost invariably turnips used for fodder—to aid in the further breaking down of the ploughed-under turf.

This longer rotation of Elliot's was his first success. It produced much greater crops and added organic matter to the soil. But Elliot was far from satisfied. He believed in the value of deep-rooted grasses (all forms of herbage used for grazing or soil improvement he termed grasses) coupled with leguminous plants. The value of legumes was, of course, well appreciated. Elliot's addition of deep rooted plants was quite an innovation.

Elliot favored deep rooted plants because they were drought resistant. He believed them to have a greater mineral content because of their plunging roots and thus to be of greater value to grazing animals. Above all he recommended them as soil improvers. As he himself expresses it: "The cheapest, deepest and best tillers, drainers and warmers of the soil are roots."

Since Elliot's day, many fine forage plants have been introduced. Elliot used chicory thickly in some of his grass mixtures. He even tried a mixture containing parsnip seed. He watched other farmers seed their worst fields down to the deep rooted, spiny gorse shrubs, as he studied the effects of deep rooted plants.

Most root crops develop a tap root which is deeply penetrating, later the root swells, becomes fleshy, and adds much organic material to this humus when ploughed-under. The tap roots of beets, turnips, mangel-wurzels often drive downward over six feet. Chicory roots penetrate over ten feet, asparagus roots much deeper, while alfalfa (Lucerne) roots frequently go down from twelve to twenty feet. These deep rooted plants utilize the subsoil to a great extent.

Elliot's belief, therefore, that these plants are usually rich in minerals has recently received considerable confirmation. It is well known now that many plants have a peculiar affinity for certain mineral substances. Deep rooted celery will pick up a considerable amount of salt if this is available. The common horse-tail weed is greedy for gold. If growing in a soil where only a small amount of this substance is present the horse-tail weed will concentrate a considerable quantity in its leaves and stems.

Deep rooted plants drive their tap roots downward with considerable force. Elliot reports that chicory roots passed straight downward, undeflected by a hard-pan a foot thick which was so hard that a powerful man with a sharp spade had to use great force to break it, in order to reach the soft subsoil.

But in addition to the organic material which the decomposition of fleshy roots add to the soil, and in addition to the manner in which the powerful tap-roots break into the subsoil, the roots themselves when they become inactive are of great value to other plants. Plant roots are constantly dying and being replaced by new ones. They form a steady supply of organic matter beneath the surface much as plant leaves and stems supply it above the surface. But more than this, the dead, hollow roots and the deep canals they formed in life provide convenient, moist channels down which other more delicate roots readily penetrate.

Always insisting upon deep-rooted plants with a leguminous base, Elliot checked upon the resulting humus accumulation. His method of speedily building up an ample humus accumulation, thus increasing soil fertility, is a feat that remains even today little short of marvellous. Today, when the farmer no longer has to depend upon such plants as the chicory, when almost every section of the country is provided with suitable forage plants and soil building plants, he will be led to wonder why any farm should become run-down.

It is well known that the natural humus accumulation of grass-lands, though relatively enormous as compared to forested areas, is usually formed very slowly. How, then, did Elliot speed up this process?

Natural humus is formed through a very simple process. Because of the breaking down of the herbage growing upon it, new humus is continually accumulating. Humus is very unstable. A portion of this natural humus is being continually further broken-down, mineralized. In soils which have developed their maximum layer of humus, the amount of new humus formed eventually equals the amount undergoing mineralization, so that a balance or equilibrium is maintained.

Upon lands where the humus deposit or its formation have been interfered with because of the use of the tools of agriculture, irrigation, the harvesting of crops, etc., the natural rebuilding is relatively slow. What Elliot suspected and was later able to demonstrate was the fact that it was possible to speed up humus accumulation on poor land by the use of proper herbage; that by the use of suitable herbage the amount of new humus added could be vastly greater than that undergoing mineralization. He realized above all the importance of leaving the surface of the ground undisturbed for a maximum period to aid in the rebuilding of the covering of humus and the return of fertility.

Throughout his extensive work, Elliot had no faith in artificials. From the fine results he obtained without them, it is easy to understand why. He saw that the use of artificials greatly damaged and speeded the breakdown of the existing humus layer. He stuck to his belief that the physical composition of the soil was quite as important as its chemical composition. He also believed that ploughing, digging, cultivation, etc., were in themselves actually damaging to the soil humus. He had come to this belief because of his former experiences.

During his days in Ceylon, he saw that young coffee plants, though by nature rather sturdy things, failed to grow when planted in a specially prepared area although they did well outside of it. Careful chemical tests showed that the soil over the entire area, both cultivated and uncultivated, to be identical *chemically*. But the *physical* condition of the soil inside the

cultivated area was quite different. This difference, Elliot showed, had been caused chiefly by the pulverizing effects of the tools of cultivation combined with the effect of sun and rain on the exposed area which had reduced the humus to an infertile dust.

The memory of this experience was eventually to culminate in Elliot's masterpiece: "The Clifton Park System of Farming." In a very real sense, Elliot's work demonstrates the immense value of the ancient organic methods as applied to agriculture.

The Mechanisation of the Compost Heap

BY SIR ALBERT HOWARD, C. I. E: M. A. (Abridged)

THE grow more food campaign has only been possible by the ploughing up of large areas under grass and the cashing in of the stored fertility collected by the Earth's green carpet. This has naturally meant a vast increase in straw and its disposal. The proper method of dealing with this straw is of course to convert it into compost under the feet of cattle and other live stock. But the conventional methods of compost making and spreading involve much additional labour which under war conditions is unobtainable.

The grow more food campaign has indeed saved the population from starvation but it has created two new problems: (a) the disposal of straw and (b) the restoration of the fertility of the soils which have produced the vital corn crops.

Obviously these two problems could be solved if we could m e c h a n i s e the making and spreading of compost by means of the power unit—the tractor—now available all over rural England.

During the last six months many of the pioneers in farming have been devoting much attention to the mechanisation of the compost heap. One of these pioneers Mr. F. Sykes, has devised a muck shifting crane driven by a tractor which will load muck into carts, turn a compost heap and load the finished humus into a manure distributor. In this way the labour needed in muck making is reduced to a minimum and the cost of composting is brought within the means of the average farmer. All the wastes of the farm and of the roadside—vegetable and animal—can by this means be converted into compost. How much compost can be made depends of course on local conditions but there is little doubt that our present day supplies of farm yard manure can be doubled and even trebled and its quality greatly improved.

The first demonstration of the above mentioned muck shifting crane was carried out at Grange Farm, Wood Walton (near St. Ives) Hunts. January 5/44, under the auspices of four War Agricultural Executive Committees — Huntingdonshire, Cambridgeshire, The Isle of Ely and the Soke of Peterborough, and was attended by over 500 farmers.

The special feature of this demonstration, which was a great success, was the efficiency of the self-cleaning grab (an invention of Mr. Sykes) which will pick up at least 5 cwt. of muck at a time and rapidly transfer it into a cart.

The fact that upwards of one hundred of this new muck shifting crane were ordered on the spot might be taken as a measure of the enthusiasm aroused by this demonstration.

EDITOR'S NOTE—Plans are being made to have a similar machine made in this country.

Finer Limestome Acts Faster

THE *Farm Science Reporter* of Iowa states that many ground limestones contain particles that vary in size from dust to the size of gravel. When limestone is applied to the soil, the fine particles dissolve readily and combine with the soil acids to neutralize them and to furnish calcium to the plants. The coarse particles, however, dissolve very slowly and many of them will not be of any value in the soil for a number of years after application.

The particles of ground limestone which are fine enough to pass through a screen with 60 openings per inch are considered to be 100 per cent available. The portion of the limestone which is retained on a screen with only eight openings per inch has a rating of only 10 per cent availability during the first one to three years after appliance.—*Horticulture.*

OUR DAILY BREAD

BY DORIS GRANT

Part I.

THE Carpenter has been here to-day—we have been waiting for six months for this visit—and I gave him some homemade whole-wheat bread with his afternoon tea. His appreciation of the bread was most enthusiastic. "This is like no other bread I have ever tasted" he said, "and so delicious that I could eat it without butter or jam." To be nice enough to eat alone—that is the test of real bread.

During the past two years I have tried this bread on all sorts of people—on the daily woman, the plumber, the gardener, the grocer, members of parliament, friends and relations.

In spite of the fact that most of these people had been devotees of white bread all their lives, their verdict had been just as enthusiastic as the carpenter's this afternoon.

Why, therefore, has there always been so much prejudice against brown bread? The answer is simple. Few people, if any, have ever tasted *real* brown bread, made from stone-ground 100% whole-wheat flour; the so-called baker's brown bread is no more like the real thing than chalk is like cheese, consisting, as it does, of white flour, bran and middlings.

If all those people who are living for the return of the white loaf could taste *real* bread there would be no more opposition to a National whole-wheat loaf.

And if only every housewife realised what a difference this bread would make, not only to the health of her family, but to the happiness, she would roll up her sleeves and start baking at once.

In two or three month's time she would begin to notice unbelievable changes taking place: she would find that the childrens appetite had improved out of all recognition; that Mary's indigestion and n e r v i n e s s was quickly disappearing; that baby John was growing twice as fast; that her own habitual tiredness and depression had given place to unbounded energy and optimism; that even her husband's uncertain temper was improving —especially (thank goodness!) at the breakfast table.

Why?

Because, among other vital elements, whole-wheat bread contains the magic vitamin B1. This vitamin is found in, and around, the wheat germ, which, to our undoing, is usually removed from the wheat grain when milling white flour.

Vitamin B1 has miraculous qualities, in fact fairy-tale-like powers, and contributes not only to our physical well being but also to our mental well being. It looks after the nerves and muscles, particularly of the heart, stomach and colon. It helps the digestion of starches, or, as the expert puts it, 'the metabolism of carbohydrates'; in fact the more starch foods we eat, the more Vitamin B1 do we require. It is commonly known that it prevents and relieves constipation, but it is not so generally known that it banishes nerviness and depression. It produces a go-get-at-it-stick-to-itiveness which is essential for any war effort: it even sustains vigour and morale. The whole morale of a country, therefore, may depend on the right kind of bread! In America, recent researches on Vitamin B1 prove conclusively that continued deficiency of this element is the *principal* cause of loss of morale, and is associated with irritability, exhaustion, criminal tendencies, neurasthenic conditions, feelings of inferiority, and unwillingness to co-operate.

The power for good contained in this amazing vitamin opens up such vistas of speculation as would lead us to suppose that if everyone were correctly fed, there would no longer be any need for prisons or asylums; that hospital and public health services would be vastly reduced; that men would become so full of benevolence and good will towards one another that wars

would be utterly impossible! Fellow-wives, what a responsibility lies upon our shoulders!

Lack of Vitamin B complex leads to unaccountable tiredness, nervous exhaustion, intestinal trouble, heart trouble or total failure, poor finicky appetite, in children to failure to grow properly, and in dogs, to hysteria.

To illustrate the magic in Vitamin B1, pigeons that have been deprived of this vitamin suffer terribly; it seems as though their poor twisted, paralysed bodies could never recover. But restore the vitamin; paralysis gives way to normal energy; and within 24 hours a miracle of natural healing has been accomplished.

In 1840, one ounce of genuine unspoiled whole-wheat bread contained 30 units of Vitamin B1. One hundred years later one ounce of white bread contained not 30 but 5 units of Vitamin B1. To obtain and maintain health, 700 units of Vtiamin B1 daily are considered necessary for health. Our whole-wheat bread eating ancestors had 1200, but to-day our average intake is only 200. Is it any wonder that we are so full of aches and rheumaticky pains, that so many of us, although not definitely ill, do not enjoy anything like real health? Is it any wonder that days lost out of work for sickness have increased nearly 60% in the last 18 years, and now represent a serious setback to our war effort? Is it any wonder also, that chemists shops are full of costly and unsatisfactory cures for the many ills caused by deficiency of Vitamin B1 in our daily bread?

The disease called Beri-beri, which is a form of paralysis, and affects the nervous system, is the recognised diagnosis of a definite deficiency of Vitamin B1. A large number of the nervous troubles we suffer from to-day are just this same disease but in a milder form, and, unfortunately, seldom recognised as such. All these nervous troubles would be non-existent if our bread and other cereal foods contained a sufficiency of B1. In fact it is now recognised that most ill-health, even without clinical symptoms, results from sub-optimel intake of vitamins.

In Labrador, after white flour, refined cereals and other 'civilised' foods became the fashion, Beri-beri became common. In 1810 a ship with a cargo of wholewheat was driven ashore. To get her off again, a large portion was unloaded and was consumed far and wide. The result was that Beri-beri disappeared and for a year no case occurred.

In 1894, Norway thought to improve the diet of its mercantile marine by substituting white bread for the customary wholewheat and rye loaf. One wise old captain refused to have this new white loaf, and took aboard a good store of whole-meal flour of rye. When members of his crew fell ill with Beri-beri, he had the immense satisfaction of curing them by the rye from his personal store. So great was the demand for this flour that the skipper's own maintenance was only ensured by strict rationing till they made port. Beri-beri is just one instance of the punishment meted out to man for interfering with foods as Nature made them.

Dr. Picton, whose work is well-known in connection with the famous Cheshire "Medical Testament", tells a good story about the comparative values of white and brown bread. Once, when he was lecturing to expectant mothers, he produced two baskets of guinea pigs. On opening the first he said: "These ladies, are guinea pigs which have been fed on milk, greens and white bread." When the ladies had duly admired and petted the quiet little things they were returned to their basket. On opening the second basket Dr. Picton said: "Now, these, ladies, have been fed on identical food, except that their bread was wholemeal. You will see the difference." THEY DID! When the basket was opened, the guinea pigs jumped out and were all over the room in a twinkling, causing two of the good ladies to spring on their chairs and gather their skirts around their ankles. When the truants were finally caught and safely restored to their basket, the laughter showed that there was no longer any doubt as to the value of whole-wheat bread. Dr. Picton, I'm afraid, did not warn those prospective mothers that there was one, just one drawback about children fed on wholewheat bread—they are so healthy, so active, so full of beans and mischief that they need constant supervision! (Well do I know it, being the mother of two!)

But there is another important vitamin in wholewheat bread —Vitamin E, which, although he is like unto a 'Minister without portfolio' is probably the most important member of the whole cabinet of vitamins.

Vitamin E prevents sterility, in fact it encourages fertility. Vitamin E, therefore, has a direct control over the birthrate; the wheat germ is almost its richest known source. In a recent broadcast Mr. Churchill was bemoaning the low birthrate. If he knew that the recent decline in the birthrate was certainly due, in part, to the fact that the bread of our people has been deprived of the wheat germ for over three quarters of a century, he would move heaven and earth—and politicians, to give us the right kind of bread.

I have recently come across a very interesting illustration of the power of Vitamin E in whole-wheat bread. A young friend has been trying for a whole year to produce a family. About three months ago she came to live with me, since when she has had, probably for the first time in her life, a sufficiency of Vitamin E and B1, due to the fact that our bread is homemade of 100% stone-ground wheat, containing all the germ. Now the miracle has happened, much to her surprise and joy. I told her husband, jokingly, the other day —"You needn't look so proud of yourself, and don't imagine that you alone are responsible! At least half the honour is due to my homemade bread!"

The importance of Vitamin E is surely forgotten or ignored by those who, having removed *all* the vitamins and minerals from the wheat to produce white flour, think to *right this wrong* by fortifying the result with one synthetic Vitamin, B1. This is indeed a farce worthy of Gilbert and Sullivan.

Why cannot men leave good food alone? It seems such insolence on his part to think he can improve on the wonderfully intricate and involved designs and laws of nature by processing, bleaching, refining, devitaminising, most of all by separating the *wholeness* of foods. We are finding only too surely that this interference brings, sooner or later, its own penalties. *In fact it has been said that neglect or contempt of natural laws is the sole cause of all our misfortunes.*

Regarding the importance of the *wholeness* of foods, the wheat grain is an excellent illustration of how, to quote Maj. Gen. Sir Robert McCarrison, "Each part of a food is dependent on every other part for its proper action." It appears that the protein of the endosperm (the kernel of the wheat grain from which white flour is milled) and the protein of the wheat germ are different but complementary; one fits into the other, and those of the endosperm are always unsatisfactory and incomplete unless completed by those of the germ. At the same time the whole orchestra of vitamins concerned has to be present. This may be one reason why white bread is so unsatisfying compared to whole-wheat bread. When white bread is eaten the eater subconsciously feels that there is something wanting and hopes to find it in the next slice and the next—and the next—but he doesn't find it till he starts eating whole-wheat bread.

This difference between homemade whole-wheat bread and white bread is aptly summed up by an old labourer in Adrian Bell's book 'Men and the Fields'. "The bread to-day hasn't got the stay in it", said the old man. "I know because I've worked on it. When I used to go to work and we baked at home, when I'd had my breakfast that'd stay by me to dinner time. But when we took to baker's bread, why, after you'd worked for an hour, that'd be gone and you'd feel faint inside."

If you value the health of your household, therefore, don't buy baker's bread, *make your own!* Although the national loaf is an improvement on white bread it still leaves very much to be desired; it is made from 85% extraction wheat flour, oats products, barley, rye, milk powder, calcium carbonate (chalk), potatoes, potato flour and various improvers. Improvers mean chemical bleaching agents and as such are expressly deprecated by the Medical Research Council. It is doubtful, owing to a loophole in the Ministry of Food's stipulation to the millers, whether there is much (if any) wheat germ to be found in the National loaf.

To obtain bread for health, both in peace and war, it is supremely necessary that the *whole* of the wheat berry, containing all the wheat germ, is converted into flour. The sooner the Government is persuaded to give us not a *National* loaf but a *Natural* loaf—the better for the health of the nation and the 100% war effort required.

Part II

Real bread consists of flour made from the whole of the wheat berry; the whole of the berry is necessary for health. Indeed the very word health is derived from the Anglo-Saxon word "wholth" meaning health or wholeness.

For three years I have been making 'real' bread with an amazing gain in health to my family. The flour I use is not only stone-ground, containing the whole of the berry, but is milled from wheat which is selected very carefully by the miller. Only wheat is chosen which has been grown on fertile soil, *without the aid of chemical manures;* wheat grown on naturally fertilized soil has a much better flavour and contains proteins and vitamins of a much higher order than those which occur in wheat grown on chemically fertilized soil (I should be nearer the truth in saying chemically de-fertilized or murdered soil).

Also, naturally grown wheat has a resistance to disease which chemically grown wheat has not, and what is even more important: this resistance to disease is imparted to the animals and human beings who eat the wheat.

It is an interesting fact, too,

that wheat straw from wheat grown on fertile soil will last ten years as thatch, while wheat straw from chemically grown wheat lasts only five years. It is unnecessary to press the analogy further; the discovery that fertile soil is a means of creating fresh vitality and health is of the first importance and represents a tremendous advance in the science of nutrition.

As bread figures so largely (often too largely) in the average diet, it is of supreme importance that it should be made from properly grown wheat which has been stone-ground, so that it should contain *real* nourishment, with all the essential vitamins and minerals. Stone-grinding preserves the vitamin content in a way which steel roller milling cannot do.

Bread made from white flour, should find no place in the diet of those who value their health. It is a devitalised food, from which all goodness has been removed. White flour represents only a part of the wheat grain and the whole grain is necessary for health (as explained in part I). With the removal of the wheat germ as in milling white flour, the essential Vitamin B1, is also removed. The digestion of starches cannot be completed without the presence of this vitamin. All those who are now longing for the return of the white loaf should know that it is white bread, not whole-wheat bread, which is indigestible.

White bread, because of its smoothness, say *seem* to cause no indigestion, but there are different kinds of indigestion, and indigestion can be present without any warning pains. This is just what happens when white bread is eaten: There is no pain, but the bread, without the accompanying presence of Vitamin B1 is not completely digested. It then causes the formation of toxins, or acid residues, which unbalance the chemistry of the body. Too great a proportion of acid residues lowers the resistance of disease. The illness which results, sooner or later, is just a form of spring cleaning on the part of the body, an effort to rid itself of a too high acid accumulation.

At this point it requires no supernatural power to prophesy that quite a few, who are now reading this article, are exclaiming: "But I just *can't* eat brown bread—it always gives me indigestion!"

If brown bread gives you indigestion, dear reader, it is a definite sign that all is not well within; that your need for whole-wheat bread is *urgent*. If the body is compared to a car, in this case, it is a faulty engine which deserves the blame, and not the fuel which is put into it. Through a deficiency of Vitamin B1, *caused by a white bread diet*, the whole of the digestive track lacks sufficient tone and strength to cope with a natural food such as whole-wheat bread.

If you will generally improve your diet and fortify it with additional amounts of B1 in the form of yeast extracts, wheat germ (when obtainable), yeast, Bemax, Froment, or Vitamin B1 tablets you will soon find that you can eat whole-wheat bread with impunity. There may be a little preliminary discomfort but perseverance is essential. Don't on any account be afraid of the coarseness (the bran content) in whole-wheat bread; among other things it is necessary to the movement of the colon.

And now we come to the recipe which is simplicity itself. It is quickly made, because there is no kneading. Here it is:

WHOLE-WHEAT BREAD

3½ lbs. English stone-ground, or self ground whole-wheat flour; 2 pints of water at blood heat (100 f.); 1 oz. sea-salt or maldon salt; 1 oz. sugar, preferably Barbados muscovado cane sugar; 1 oz. yeast, or up to 4 oz. for extra food value.

The important points are (1) to warm the flour and the baking tins, (2) to froth up the yeast separately, (3) to make the dough wet enough to be slippery, and (4) that whole-wheat dough must not be kneaded and only requires a few minutes to mix.

Mix the salt with the flour in a large basin and warm it on the oven top or above a low gas flame so that the yeast will work quicker. Crumble the yeast into a pudding basin, add the sugar and ¼ pint of the warm water. Leave for ten minutes to froth up; then stir to dissolve sugar. Pour this yeasty liquid into the basin of warm flour, add the rest of the warm water, and stir the whole with a wooden spoon until the flour is evenly wetted. The resulting dough should be wet enough to be slippery; most bread is too dry. Whole-wheat flour differs in moisture content and in fineness. Dry and finely ground flour needs a little more than 2 pints of water to make the dough slippery.

Grease three 4-pint tins inside and warm them well. Spoon the dough into the warmed tins, put them about two feet above a low gas flame (or in the oven while the oven is warming up), cover with a cloth and leave for about twenty minutes to rise by about half. Then bake them in a moderate oven (400 F.) for forty-five minutes to one hour. An oven thermometer is useful.

Tapping the top crust with the knuckles will show by the sound when a loaf is properly baked.

The right sound is soon found. When baked, turn out the loaves to cool upside down on a wire grid. If the loaves do not come out of the tins easily, leave them to cool for ten minutes.

Bread is best kept for twenty-four hours before eating.

I think I ought to tell you of the interesting and accidental discovery that contributed to the success of this recipe. I said "accidental discovery" but I like to think that it was an "instinctive" one.

After I had been making bread for about six months I discovered, to my amazement, that I had been missing out what is usually considered the most important part of the whole process—I had been omitting to knead the bread after the first rising! In spite of this my bread was delicious. It began to dawn on me, that it was, perhaps, because of this very omission that my bread was considered, by both family and visitors, so particularly good.

When making the next batch of bread I kneaded one loaf and left another unkneaded. These loaves were then baked in the same oven for the same length of time and were cut for testing at the same time. The kneaded loaf smelt like ordinary Bakers' bread and its taste was quite unexciting. The unkneaded loaf smelt inviting and its taste was delicious. The difference between these two loaves was quite unbelievable.

My own explanation of this, for what it is worth, is that the air spaces formed in the dough by the working yeast contain some of the essential oils, vitamins, or other qualities of the wheat. When these air spaces are broken open during kneading, these qualities escape and are lost. I have had this theory confirmed recently by an old baker. He told me that on no account should whole-wheat bread be kneaded, but, that white bread could be kneaded without harm. It would seem, therefore, that white flour has nothing to lose during the kneading process, having already lost all its goodness and qualities in the milling process. In fact, it would seem that even playing football with white flour dough wouldn't hurt it in the least.

You will find homemade wholewheat bread so delicious that you may, at first, eat more of it than is good for you. Bread is a concentrated food, and although an excellent one, should be used with discretion. The minerals in bread being mostly phosphatic, are acid-forming in tendency—that is, they leave behind an acid residue when burned up by the digestive system. This acid residue must be balanced by eating a sufficiency of foods which leave behind an alkaline residue. In other words, when we include bread at a meal we should endeavour (at that meal or some other) to include a sufficiency of salads or vegetables in some shape or form. For average use, bread once a day is sufficient for health.

To make bread may seem, at first, more trouble than buying it over the counter but it should be remembered that *Food is the most important single factor in health*, and that the right sort of bread is one of the most important contributions to right feeding, and therefore to health. The housewife who makes her own bread will have the great satisfaction of knowing that she is building up health and happiness for her household. Health does not just happen. It must be earned like all other worth-while things.

And now I hope you will want to rush to the kitchen, roll up your sleeves and bake some 'real' bread. But of course you must have the right kind of flour and you must have some yeast. Otherwise you will be like the tramp who said to his brother tramp: "If only we had some eggs we could have some eggs and bacon, if only we had some bacon."

Nasturtium As Food

SOME of our service men and correspondents in England noticed that many of the gardens there have flowers mingled with the vegetables to add beauty to usefulness. You may do the same and yet have an appetizing relish if you *plant nasturtiums* with the potatoes and onions. Their seeds and pods make a pickle, the pickled seeds being somewhat like capers. The leaves have been used like cress in salads in England, where the plant is called "Indian cress." Both leaves and flowers are attractive for garnishing. In fact, so useful did the nasturtium become that as far back as 1683, Worlidge, an English writer, said, "from a Flower are now become an acceptable Sallad, as well as the blossom." In 1690 they were grown in the royal kitchen gardens of France.—*Nature Magazine.*

Organic Substitutes For Compost In The Spring Garden

BY J. I. RODALE

IT is best to have your own compost ready as that is superior to anything else you can buy but if conditions are such that this isn't possible, you can save the day by using purchased substitutes. Bone meal, dried blood and wood ashes could be made the basis for an excellent fertilizer combination. For an acre of vegetable garden a total of about 625 pounds would be satisfactory, distributed about as follows:

Bone meal	250 lbs.
Dried blood	125 lbs.
Wood ashes	250 lbs.

If your plot is 40 x 110 feet, it represents a total of 4,400 square feet. Since an acre is 43,560 square feet, you will need only 10% of the above amounts. Bone meal and dried blood may be purchased in the usual places where fertilizers are bought. Wood ashes is a more difficult proposition in some sections whereas in other places it is quite common. Ordinarily it won't be economical to make a bon-fire of wood to get the ashes. Keep the ashes out of the rain, because leaching caused by water will reduce the potash content by more than 60%. Hard wood ash is richer in potash than soft wood. The above figure is based on hard wood. If it is soft wood you would have to more than double the amount of the ashes.

There are many other organic materials available such as cotton seed meal, tankage, linseed oil meal, fish meal, shrimp meal, powdered hoof and horn meal, slaughter-house refuse, leaf mould, soy bean meal, etc. Most of these are slow acting. Dried blood will give an early effect. It is far better, however, to be patient rather than resort to the so-called chemical fertilizers. For ideal results the materials mentioned above should be composted, but since we haven't time for that this time we must use them as is. But we *can* try and get them into the ground as early as possible so that they can begin decaying. Never use raw garbage without composting.

If you have an excess supply of corn cobs they may be burned up. Their ash is rich in potash. If you are near a lake and can get some of the water-weeds you will find such material excellent for its potash. Such lake-weeds need not be burned for the ash, as decay will take place exceptionally quickly.

The materials we have mentioned so far are concentrated, more or less, and do not give the soil the spongy quality it needs to hold moisture and for aeration. So, it would be best to buy some peat moss at your seed store. We noticed a big bag which weighs about 30 or 40 lbs. that sells for about $1.95. It is rather expensive, but what are you going to do? Michigan peat humus, which is really a fertilizer and much better than peat moss, can be purchased in bigger quantities much cheaper, at probably one-third the price. We have seen some Michigan peat humus recently and it looks wonderful, but the companies are way behind on their orders and it is hard to get.

There is no need to give figures of the quantity of peat moss or humus to use because there is no danger of overuse. Put it on at least half an inch up to 2 or 3 inches thick and work it into the top five or six inches of soil.

The table given on next page is taken from the U. S. Yearbook of Agriculture for 1935, pages 155 and 156. It is interesting to note that under the table there appears the statement, "In almost any location there are materials available for the hauling which make useful soil amendments. This is especially true if the landholder is located near an industrial area or any large city." These kinds of materials should be composted along with manure by Sir Albert Howard's practical method.

Percentage Composition of Various Materials

From U. S. YEARBOOK OF AGRICULTURE For 1935, pages 155 and 156.

Material	Nitrogen	Phosphoric acid	Potash
Apple leaves	1.0	.0.15	0.35
Apple pomace	.20	.02	.15
Banana skins (ash)		3.25	41.76
Cantaloup rinds (ash)		9.77	12.21
Castor bean pomace	5.0- 6.0	2.0- 2.5	1.0- 1.25
Cattail reed and stems of waterlily	2.02	.81	3.43
Coal ash (anthracite)		.1- .15	.1- .15
Coal ash (bituminous)		.4- .5	.4 .5
Coffee grounds	2.08	.32	.28
Corncob ash			50.00
Corn (green forage)	.30	.13	.33
Crabgrass (green)	.66	.19	.71
Duck manure (fresh)	1.12	1.44	.49
Eggs	2.25	.40	.15
Eggshells	1.19	.38	.14
Feathers	15.30		
Fish scrap (fresh)	2.0- 7.5	1.5- 6	
Grapefruit skins (ash)		3.58	30.60
Lemon culls (California)	.15	.06	.26
Oak leaves	.80	.35	.15
Orange culls	.20	.13	.21
Peanut shells	.80	.15	.50
Peat	.5- 4.00		
Pigeon manure (fresh)	4.19	2.24	1.41
Pigweed, rough	.60	.16	
Pine needles	.46	.12	.03
Potatoes, leaves and stalks	.60	.15	.45
Ragweed, great	.76	.26	
Salt-marsh hay	1.10	.25	.75
Sewage sludge from filter beds	.74	.33	.24
Soot from chimney flues	0.5-11	1.05	0.35
Stringbean strings and stems (ash)		4.99	18.03
Sweetpotato skins, boiled (ash)		3.29	13.89
Tea grounds	4.15	.62	.40
Tobacco leaves	4.00	.50	6.00
Tobacco stalks	3.70	.65	4.50
Tobacco stems	2.50	.90	7.00
Tomato leaves	.35	.10	.40
Wheat straw	.50	.15	.60
Wood ashes (leached)		1.0- 1.5	1.0- 3
Wood ashes (unleached)		1.0- 2	4.0-10

Reader's Correspondence

Question

To what extent does organic matter which has decayed without animal activator or fertilizer provide nutrients and not merely a sponge to hold water?

Answer

It seems to be the consensus of opinion of those who have been making compost for many years that good results are not obtained without animal manure. It seems that animal matter contains hormones which help plants to grow. It is helpful even if it is present in only extremely small quantities. Sir Albert Howard says in his Agricultural Testament:

"When *san* hemp is grown for green-manuring or for seed in India, satisfactory results are only obtained if the crop is manured with cattle manure or humus". Again he says on the same subject: "In Ceylon particularly, attempts have been made to prepare humus without animal wastes. The results have not fulfilled expectation. The breaking down of such resistant material as the leaves and prunings of tea is then unsatisfactory: the organisms which synthesize humus are not properly fed: the residues of these organisms which form an important part of the final humus lack the contributions of the animal. No one has yet succeeded in establishing an efficient and permanent system of agriculture without live stock. There is no reason therefore to suppose that the tea industry will prove an exception to what, after all, is a rule in Nature."

Another interesting point is that, not only must you use animal manure or material in the heap, but the manure which comes from animals fed organically-produced food, is far superior to that from any other animals.

Where green material is used alone it would contain more than mere sponge material. It no doubt has important nutritional qualities for plants, but in the long run it seems that it would not be sufficient.

FOR FLORIDA SOIL CONDITIONS

This idea appeals very much. Have had no commercial fertilizer or spray on place this year, in fact have always been against the poisoning practice, since my parents were physicians of the herbal school. I raise flowers and plants to sell. This year dry weather has had an adverse effect, but in spite of that can see that the compost is going to be wonderful. For our sandy soil I think the no-plowing idea is going to be a big help to me, but in this the compost will be the principal factor. Have my garden spot all bedded up at last, which is essential here, this spring I will plant cowpeas on all of it, and put out compost that is ready between the rows, then mow cowpeas just as I get ready next fall, and set plants and plant garden in rows that I expect to be in very good shape. I do most of work myself, and after it is turned over in fall, our grass and roots do not rot, but dries and has to be raked out, which consumes a lot of valuable time, and by the time I get around with it, the beds are too dry to plant, as we often have very little rain thru the winter. I preach organic gardening in season and out, of course, but next season expect to really show results, by not turning the beds upside down.

Mrs. M. R. Hoffman,
Fort Myers, Florida.

Dear Mr. Rodale:

My father, who was a very successful farmer on these acres used to have an old colored man with a yoke of oxen spend his entire time hauling leaves from the woods and spreading them on the land. There they were plowed under. Wasn't that organic farming?

Elizabeth Daniel,
Summit, N. J.

Dear Sir:

This is a farming community in embryo. When I explained to a friend that those who joined our group would use organic methods of farming—no chemical

fertilizers—he answered:

"Don't you use superphosphate in your manure? If you don't I should think you were guilty of non-cooperation with nature, because, as you know, without it most of your nitrogen is lost." I'm sure he is wrong but I'm not sure how to answer. Please advise me.

Mrs. Carl Paulson,
Upton, Mass.

Answer

Dear Mrs. Paulson:

You can be sure that far better compost will result from manure if it does not have any contact with superphosphate. The Chinese have been making compost for over 4,000 years and do not use any superphosphate or any other chemical as a rule with it. Their agriculture has withstood thousands of years of excessive use of the land.

Sometimes when China is referred to as a glowing example, some people answer and say "if that is so, why is part of China a desert today"? "Why are there periodic famines and why is China a second rate nation"? The answer is that such conditions exist for two reasons: overpopulation and lack of rainfall. Were it not for those two disadvantages, China today would be a Garden of Eden. In rural U. S. communities density of population is 41 to the mile, in England it is 660, in China it is about 1800. Take the case of the dry wheat region of the west where the rainfall is perhaps one half of what it is in the east. I am wondering, with our present system of agriculture, how long it will be when that section becomes a desert. This is a far cry from the use of superphosphate in connection with manure.

To answer your question would take several chapters describing all of the disadvantages of using chemical fertilizers, such as killing of the earthworms and the bad effect on the biologic organisms in the soil, etc. Your friend talks about non-cooperation with nature. The use of chemicals has interfered with nature's cycle to such an extent that man is beginning to suffer disastrous plagues of disease and insect infestations.

There are many farmers who handle their manure in a most careless manner, leaving it open and rains perhaps wash much of the nitrogen into the drains. It is important to handle manure properly and to compost it properly and as soon as possible. In the compost heap, nature will work within the province of a formula that it took Sir Albert Howard perhaps thirty years to work out. Compost, made according to Sir Albert Howard's method, has never yet shown a failure that I know of.

The use of leaves in a compost heap is very important, especially in those sections of the country where it is known that the soil is deficient in some respect. Leaves come from trees. The roots of trees are known to go down as far as 20 feet and comb the sub-soil for elements that do not exist in the upper soil.

Sir Albert Howard, in his Agricultural Testament has stated that at Pusa in India, the soil is known to be deficient in phosphate. Yet that section has wonderful crops and sends its products great distances. Scientists, who have checked up, have found that it was due to the trees bringing up the phosphate that was locked up twenty feet below the surface. We believe, therefore, that it is advisable to gather as much leaves as possible in the fall, for use in all compost heaps. It is best to let them wither first in a separate pile before placing in the compost heap.

Coming back again to superphosphate, it is true that chemical laboratory tests recently have shown that it does lock in more of the nitrogen but there is unquestionable evidence that the prevalent chemical conception of the feeding of the plant is in error. It ignores the action of bacteria, fungi and other organisms in the soil which prepare the food for the roots. The mere dumping of N (nitrogen) P—(phosphorous)—and K (potash) into the soil and ignoring its biologic life will eventually lead to an unbalanced plant. It may look nice and big, but is it fit for human or animal consumption? Sir Albert Howard, in referring to the reasoning of those who follow the chemical method, calls it the NPK mentality.

Dear Mr. Rodale:

I have been a subscriber to your magazine for a few months and must say that never before have I read a periodical which in my opinion is so full of interesting articles as is "Organic Gardening."

On our little 16 acre farm we have four cows, about 200 laying hens, one horse, and produce yearly about 7500 broilers and 50 to 75 Hampshire hogs. The small acreage is at present divided into one acre of fruit and vegetable garden, 6½ acres of alfalfa, and about 6 acres of mixed pasture furnishing greens for our livestock. The question in my mind is:

1. Can we mix all the manures into one pile, and

2. Is it advisable to add to this manure, mixed or not mixed, any phosphate, and is so what kind.

3. Should the pastures be manured only at certain times and if so how many tons of manure, mixed or unmixed, per acre.

4. What is the best way to start a population of earthworms in our fields.

Twin Gates Farm,
Arlington Heights, Illinois.

Answer

Dear Mr. Rost:

Thank you very much for your letter of February 23rd.

1. It is best to mix manures together, especially where you have horse and cow droppings. If in a pinch you have to use manure without composting, you know of course that you have to be careful of chicken droppings, as they should be mellowed or rotted before use.

2. Where chemical fertilizers are used, advice is usually given to use superphosphate with the manure. We do not find this necessary. However, it would not do any harm, but probably do some good if you could obtain raw ground phosphate rock, and sprinkle that in the bedding of your barn in which the manure is to be obtained. Superphosphate is a strong chemical which we do not recommend. In the compost heap you could use lime, wood ashes, or dolomite, which is a form of lime which contains magnesium.

3. If you are going to use your pastures for animal grazing, you would not need to apply any manure as the animals will do that automatically. If, however, your pasture is not in good shape it probably would be best to give it a good dressing of compost in the Fall. There should be at least five tons to the acre, and you can use more, depending on the amount you have available. There are many factors which must be taken into consideration in order to give a more comprehensive answer to this question. This would include fertility of the land, green manure plants plowed under recently, etc.

4. For larger sized farms we do not think it is practical to try to breed earthworms for application to the land on a large scale, except that earthworms will soon come when you apply composts or other organic materials to the soil. On a small farm, however, you might take a field of a few acres and fallow it for a year if you can afford to leave it out of cultivation. During the period of fallowing it should be covered with a mulch of straw or hay or corn stalks, sufficiently high so that the moisture will accumulate underneath. This would mean that it should be about 6 to 8 inches thick, being sure, however, that it covers the ground sufficiently that the proper condition of moisture is maintained under the mulch. You will be amazed at the way the earthworm population will multiply under this mulch. At the end of a year it could then be plowed under.

Dear Mr. Rodale:

I have a farm in Connecticut with a number of cows on it, and so, have quite a supply of manure. Like most New England farms, the soil is run down, and a good part of our soil is quite gravelly. I have a large pine grove on the farm and have quite a large supply of pine needles. We also have considerable trees in our woods. Do you think it would pay me to mix pine needles with the manure this month before spreading it on the land in the spring? Near us there is also a considerable amount of new manure and piles of straw which I could buy quite reasonably. Do you think it would pay for me to mix this stuff and put it on the land a month or two afterwards or does it have to be aged for any length of time to be any good as a compost?

I am thinking of taking five acres of pasture land in which nothing has been done for the last 25 years, and instead of plowing it up just harrowing it very thoroughly this spring, working in the manure and compost and then planting pasture seed.

The man who runs my farm has a lot of trouble with mastitis with the cows.

Anonymous.

Answer

Dear Sir:

Pine needles should be composted with the manure in a compost heap. If you mix it with manure and place it on the land raw, there will be a slight setback in your crop. This is especially true of fresh straw that is plowed under. It seems to be a generally accepted fact that plowing under of straw actually hurts the next crop, and its advantages will not be felt until the succeeding crop. Where large quantities of straw or pine needles would be plowed under, it would be best to fallow that land for a year to be sure that all of it has decayed.

If you can purchase any manure and straw, why not do so, and make compost out of it according to the method outlined in the enclosed leaflet. After all, it takes only about three months to make finished compost.

A machine has just been perfected in England that mechanizes the compost heap. We are

writing to the manufacturers to see if they would let us contact an American firm to make this machine. If we are successful we will announce it in "Organic Gardening".

Regarding your proposal of harrowing five acres of pasture without plowing—this I am sure would not work out. Even Faulkner, in his book, "Plowman's Folly" states that a grass sod should be plowed under. You would have very much trouble with weeds if you didn't plow.

Regarding the trouble with cows that you mention, they would show an improvement very soon after being fed with food raised yourself by the organic method. We are feeding chickens and steers such food, and they are doing wonderfully.

Dear Mr. Rodale:

A couple of years ago I obtained from the County Agent's office the formula for a chemical to quickly rot down vegetable matter — chemical activators — superphosphate, sulphate of ammonia and powdered limestone. Now I am wondering whether my garden will be better off without that compost, I have become so sold on the dangers of chemical fertilizers.

Composting on a large scale presents quite a problem to me. It seems to me that it will require as much space to make compost as that compost will cover for growing crops. In other words, half of a given area would be needed to make the necessary compost.

A further problem is lack of manure, having no stock. I can get plenty of vegetable matter and for a time at least, plenty of dirt but I have to buy the manure.

I have been afraid to use all garbage for fear of odors and rats. The long (500 ft.) side of our lot is on a side street and being right in town I can't run any risk of creating a nuisance.

You have mentioned in the magazine that sheep and cow manure purchased at seed stores can be used. I thought that those dried manures had been so heat treated as to kill *all* life in them so I don't see how the needed bacteria would be there.

In speaking of garbage, I meant that I've used only vegetable and no meat scraps.

Mrs. H. W. Kofsky,
Oberlin, Ohio.

Answer

There is no question that the use of chemical activators in the compost heap turns out a much poorer compost. You state that it might require as much space to make compost as that compost will cover for growing crops. This is not quite correct because since a fair application of humus would consist of 1 inch coverage over the entire surface and since a compost heap, after it is settled, is about 3 feet high it would then show that the compost heap should cover 1/36th of the surface of the garden, and should be quite a small share.

One substitute for manure is kitchen cuttings, including meat scraps. But lacking sufficient of that, you can purchase such things as dried blood, tankage, bone meal and other animal matter. You would have to make inquiries in your section as to where they are obtainable.

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bage, provided you have enough green matter and earth to cover it with. If you will sprinkle this garbage with lime and cover it with green matter according to the Indore Process instructions, you should have no trouble with rats. For use where there are close neighbors the ordinary type of compost heap where kitchen scrap is used, or manure, would not make any odors. On the other hand, such items as dried blood might, so you would have to go easy on that. In such a case you might want to dig out a pit, and decay such material underground, covering it up so that there will be no odor.

I am afraid that the average sheep and cow manure that is purchased in seed stores is treated with chemical fertilizers. As a rule you will see in very small letters on the bottom that superphosphate or some other chemical was used. Where manure has been dehydrated or heat-treated, it would greatly reduce its value to the compost heap.

Dear Editor:

May I tell you that your Magazine is proving tremendously interesting to me. Please let me have your opinion and that of some of your readers on the question of earthworms in pots.

Most Begonia growers go to great trouble to keep earthworms out of pots in which Begonias are growing, believing that they are quite injurious to the roots and well being of the plant. What foundation is there for this belief? Personally, I have saved every earthworm I have come across for many years, and thus far have not found them harmful in pots, but I am prejudiced in their favour. What is the objection to having them in potted plants' soil?

Maria Wilkes, Editor,
The Begonian.
Los Angeles, Calif.

Answer

Dear Miss Wilkes:

Regarding the question of earthworms in pots, the originator of the hybrid soilution earthworm which is now bred in large quantities by many of the readers of ORGANIC GARDENING, obtained his experience from raising plants in pots with and without the use of earthworms. Two things must be watched where earthworms are placed in pots: First—there must not be too many earthworms, and secondly, there should be some organic matter in the soil of the pots for the earthworms to work on.

It would be very interesting if you would experiment and use earthworms in some pots, and leaving others without any, and seeing what the results would be.

Would you keep in touch with us?

Dear Mr. Rodale:

Enclosed an informative letter from Victor H. Ries. We have been discussing mulches and fertilizers (organic) for acid loving plants, such as Rhododendrons, Azaleas, etc.

As a result of this letter, I have revised the method of making acid mulches and I can now make more free use of leaf mold for general garden purposes.

There are any number of organic and harmless inorganic ma-

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NAME .....

.....

ADDRESS .....

.....

terials that are used to acidify soils. Amongst the best is alum, (Aluminum Sulphate) which housewives also use in the kitchen and we men folks use to cauterize razor scratches. Tannic Acid, acetic acid, (plain vinegar) and saw dust.

Herman Schaeffer,
New York, N. Y.

Cooperative Extension Work
in
Agricultural & Home Economics
State of Ohio
Columbus 10, Ohio

January 28, 1944.

Dear Mr. Schaeffer:

You will find that Clement C. Bower's book, Rhododendrons and Azaleas, published by The Macmillan Company, is, without question, the finest and most complete book on this subject.

I am wondering from your letter whether you have the feeling that a mulch of oak leaves has an acidifying action. From tests ran at Boyce Tompson Institute, we know that oak leaves when decomposed are not acid. Neither is the ground beneath them. In fact, if anything, it is infinitesimally sweeter than it was before.

The Nursery Manual was published 14 years ago, and, consequently, there are to be some changes in recommendations between then and now. In our book, Floriculture, we use the dried blood mixture, which, if I remember correctly, was originally developed in New Jersey. Actually, I doubt very much whether you will have any measurable degree of difference in reaction produced by cotton seed meal, soy bean meal, and dried blood. The only advantage of dried blood is that it will run from 9 to 14 percent nitrogen, whereas the other two materials will run from 6 to 7 percent. On the other hand, they will contain about 2 percent each of phosphorus and potash, whereas dried blood does not. I believe you will account for the apparently superior results you obtained by the use of dried blood; that is, its greater nitrogen content.

Sincerely yours,
VICTOR H. RIES,
Extension Floriculturist.

Dear Mr. Schaeffer:

It is interesting to hear that oak leaves, when decomposed, are not acid. There seems to be a common fallacy regarding the use of many chemicals for the purpose of creating an acid condition where such a condition is desired. A very careful test would have to be done to see what the final effect is on the biologic life in the soil.

You mention acetic acid(plain vinegar) as being harmless. If you put some vinegar on an earthworm, it will kill it instantly. The trouble is that no experimental work has been done for the purpose of determining the effect of various chemicals on soil organisms. We will be able to do some of this, soon and much more after the war. Chemical Sulphates are dangerous in the soil. They give rise to bacteria which kill off beneficent fungi. Saw dust and dried blood are good. Peat moss is excellent because it is usually acid.

Dear Mr. Rodale:

The December issue was quite interesting with the complete publication of the debate in the House of Lords. This proves what a timely work you are engaged in at this critical period. Imagine a debate of this nature in our own Senate. No, that couldn't happen here! Our politicians are too engulfed in their

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ORGANIC GARDENING — Emmaus, Pennsylvania

petty policies and partisan ideologies. Basic social rehabilitation, which should begin with the soil, is too far removed from their sphere of interest, but they will have to face this vital issue sooner or later, before there can be any progressive social betterment and the enjoyment of health.

Sir Albert Howard's book, "An Agricultural Testament", is splendid, and the more I read of it, the less inclined I am to write articles about Organic farming, when his experiences carry so much greater weight than anything I can offer.

His conclusions however, substantiate the scientific findings of Naturopathy, which is, that Optimal Health is the result of Optimal Nutrition. The soil when naturally nourished is able to maintain the health of plants, and the fruits of such healthful plants, the health of animals and human beings alike. Such natural health defies all infection and dis-ease (lack of ease).

Sick soils, plants and animals when treated with organic medicines do not improve, because the cause of the dis-ease is not corrected. The supply of all the elements of life in a symbiotic manner is the only natural or biological course for the correction of all the ills of living things.

The man who doses himself with drugs merely combats the physiological upheaval in his body. Sooner or later this combative treatment will destroy the organism. This applies equally to the soil, when inorganic chemicals are used to improve it, or to plants, when poisonous insecticides are sprayed on to kill bacteria, which prey only on sick organisms.

The Health of the soil, plants and animals, including man, must come from right education, which must be based on organic life. This is why I consider your publication the fundamental health journal. Without the soil there is no food, which contains all life. Improve the soil to optimal healthfulness and you will improve plants, animals and human beings.

Jules Angst—Wilkins, N.D.
The Natural School
Isles of Pines, Cuba.

Organic Gardening:

Can you advise me whether the "Rototiller" manufactured by Rototiller, Inc., Troy, New York, is suitable equipment for a good sized vegetable garden.

J. M. S. Ewing.
Havre de Grace, Md.

Answer

Dear Mr. Ewing:

The Rototiller is a very cute machine, but rather expensive. It goes through the ground with extreme speed, and I am afraid it kills off many earthworms which we organic farmers and gardeners are trying so hard to encourage.

I have seen one of these machines in operation. It does produce a wonderful seed bed, but makes a terribly loud noise—much louder than the average tractor. I have heard other people say that it makes such a fine seed bed that in a dry season the bed would tend to dry out very quickly.

From a theoretical stand-point the speed with which this machine goes through the ground would result in shearing the particles of soil and hurt it to some extent. Continual cultivation with a Rototiller after a number of years perhaps might do some

[illegible] the soil because of this

[illegible] of days thinking out [illegible] this letter and [illegible] or no about the [illegible] is up to you to [illegible] in action and [illegible] yourself. What I say [illegible] any reaction based [illegible] have seen and heard.

Dear Mr. Rodale:

[illegible] like to relate a good [illegible] of what compost will do. Last summer we started putting [illegible] all lawn clippings, [illegible] and so forth. On [illegible] I drew some small [illegible] By early fall the bottom [illegible] had formed a [illegible] compost and the potatoes [illegible] green. A few rods from the [illegible] had our potato patch [illegible] were blighted down to the ground, but those growing [illegible] of the side of the compost [illegible] so dark green, I said [illegible] almost looked blue. I just [illegible] a few acres but intend to [illegible] with compost this summer. I feel I need your magazine too.

H. F. Utecht,
La Grange, Ill.

Question

My lawn has been badly affected by the use of poison sprays over a period of years. What is the best thing to do about it?

Answer

The treatment is a heroic one; namely, deep ploughing and making a new lawn.

AN AGRICULTURAL TESTAMENT

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Organic Gardening

Emmaus, Pa.